



United States Department of the Interior
Bureau of Land Management
Tulsa District
August 1995

DRAFT TEXAS RESOURCE MANAGEMENT PLAN AND ENVIRONMENTAL IMPACT STATEMENT





The Bureau of Land Management is responsible for the balanced management of the Public Lands and resources and their various values so that they are considered in a combination that will best serve the needs of the American people. Management is based upon the principles of multiple use and sustained yield; a combination of uses that takes into account the long term needs of future generations for renewable and non-renewable resources. The resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness and natural, scenic, scientific and cultural values.





United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Tulsa District
221 N. Service Road
Moore, Oklahoma 73160-4946HD
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1995

Notice

This copy of the Draft Texas Resource Management Plan (RMP) and Draft Environmental Impact Statement (EIS) is provided for your review and comment. This document describes and analyzes three alternatives for the development of Federal oil and gas within the state of Texas. The purpose of this review is to improve the impact analysis and the decision making process. We welcome your comments.

Written comments should be addressed to:

Paul Tanner
Assistant District Manager
221 North Service Road
Moore, Oklahoma 73160-4946

Written comments must be post-marked no later than January 6, 1996, to be considered in the Proposed RMP/Final EIS.

Comments on the Draft RMP/EIS may be submitted in writing or presented verbally at the scheduled public hearings. These public hearings will be advertised in the local news media. Oral comments will be accepted at the following public hearings:

<u>Date</u>	<u>Time</u>	<u>City</u>	<u>Hearing Location</u>
December 5, 1995	3-7 p.m.	Amarillo	Ramada Inn East, 2501 Interstate 40 East
December 6, 1995	3-7 p.m.	Midland	Best Western Midland, 3100 W. Wall
December 7, 1995	3-7 p.m.	Arlington	Arlington Hilton Hotel, 2401 E. Lamar Blvd.
December 12, 1995	3-7 p.m.	Austin	Austin Hilton Towers, 6000 Middle Fiskville Road
December 13, 1995	3-7 p.m.	Houston	Hilton Southwest, 6780 Southwest Freeway
December 14, 1995	3-7 p.m.	Corpus Christi	Sheraton Corpus Christi Bayfront, 707 N. Shoreline Dr.

A 10-minute time limit will be placed on all oral comment presentations. Oral comments must be accompanied by a written synopsis of the presentation. Written and oral comments will be fully considered and evaluated in preparation of the Proposed RMP and Final EIS.

If changes in the final EIS in response to comments are minor, the Final will include only those changes and will not be a reprint of the entire EIS. Reviewers are urged to retain this copy of the draft EIS to be used with the Final EIS.

Sincerely,

Assistant District Manager

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DRAFT

TEXAS RESOURCE MANAGEMENT PLAN

ENVIRONMENTAL IMPACT STATEMENT

Abstract: The Draft Texas Resource Management Plan (RMP) and Environmental Impact Statement (EIS) describes and analyzes three alternatives for managing the Federally owned minerals, specifically oil and gas, within the State of Texas. The RMP/EIS fulfills the requirements for comprehensive land-use planning for public lands in accordance with the Federal Land Policy and Management Act of 1976. All actions within this document conform to and are designed to meet the requirements of all applicable laws. The three alternatives address the degree to which Federal oil and gas leasing will be allowed. The three alternatives are: A. Continuation of Present Management (No Action), B. Intensive Surface Protection (Preferred Alternative), and C. No Leasing.

Type of Action: ☒ Administrative ☐ Legislative

For further information contact:

Paul Tanner
Assistant District Manager
221 North Service Road
Moore, Oklahoma 73160-4946
Telephone: (405) 794-9624

Comments have been requested from individuals, groups, and agencies shown on the partial distribution list in Chapter 5.

Date of draft filing with the Environmental Protection Agency: October 2, 1995
Comments on the Draft RMP/EIS must be received no later than: January 6, 1996

Recommended:

Approved:

Jim Sims 8-7-95
District Manager Date
Tulsa District

William C. Perkins 8/9/95
State Director Date
New Mexico

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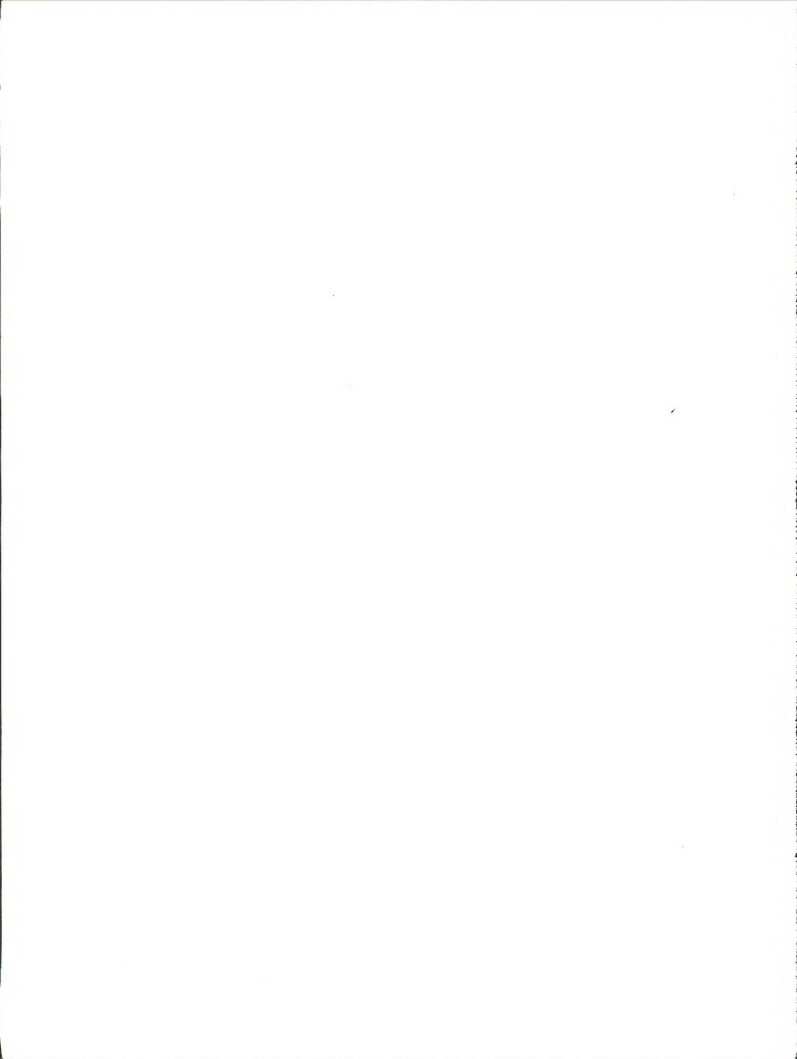
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SUMMARY

The Draft Texas Resource Management Plan (RMP) and Environmental Impact Statement (EIS) identifies and analyzes the future options for managing the Federal mineral estate situated within Texas administered by the Bureau of Land Management (BLM), Tulsa District.

The Texas RMP is being prepared using the BLM planning regulations issued under the authority of the Federal Land Policy and Management Act of 1976. When completed, the RMP will provide a comprehensive framework for managing the Federal minerals within Texas over the next 20 years.

The contents of this Draft RMP/EIS focus on resolving one resource management issue, that being the leasing and development of Federal oil and gas resources in Texas.

The issue and planning criteria are discussed in Chapter 1. Those aspects of current management that are not at issue are covered in the Continuing Management Guidance (CMG) section of Chapter 2. CMG was developed primarily from current laws, regulations, manuals, existing land-use plans and BLM policy.

Three RMP alternatives have been developed to describe the different management options available to the BLM for administering Federal oil and gas in Texas. These alternatives were specifically developed to respond to that issue. Each alternative presents a different level of oil and gas leasing stipulation application. Together with the CMG, each of the alternatives forms a separate, feasible land-use plan.

The three alternatives developed for the Texas RMP are summarized below and are further described in Chapter 2. The impacts anticipated from these alternatives are described in Chapter 4.

ALTERNATIVE A. No Action

This alternative represents a continuation of present resource allocation levels and management practices as described by the CMG. This alternative provides a baseline for comparison of other alternatives, and may not adequately resolve the issues identified in the RMP/EIS.

Oil and gas leases would continue to be issued with the standard lease provisions as well as with surface resource protection stipulations required by executive orders, laws, regulations or policies.

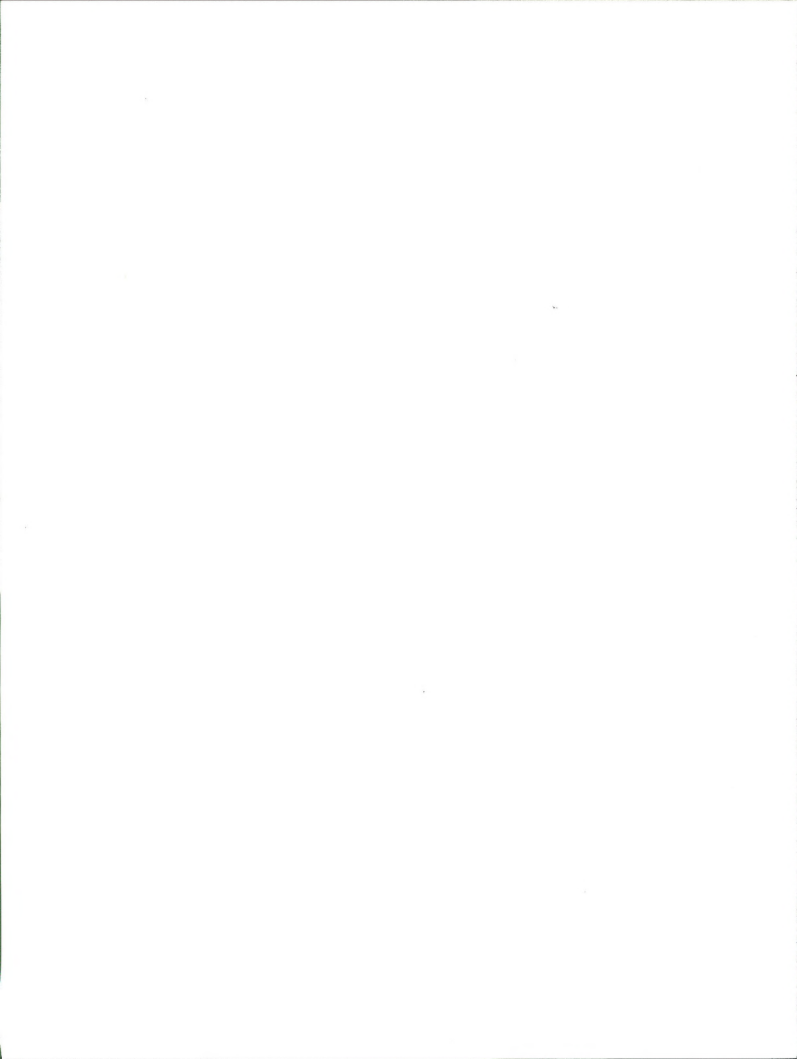
ALTERNATIVE B. Intensive Surface Protection

This represents an alternative which would place primary emphasis on protecting important environmental values through the use of additional leasing stipulations. The goal of this alternative is to change present management direction so that identified surface resource values are considered in the leasing process in a manner that provides additional protection for valuable surface resources.

Under this alternative oil and gas leases would continue to be issued with the standard lease provisions, with surface resource protection stipulations required by executive orders, laws, regulations or policies as well as additional multi-resource protection stipulations needed to protect valuable surface resources.

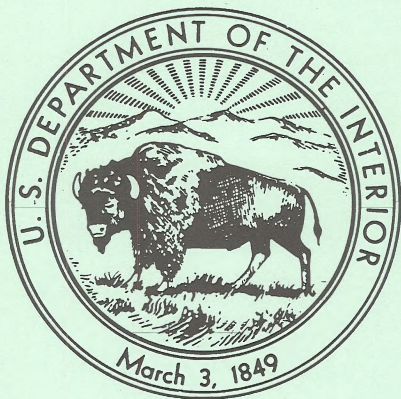
ALTERNATIVE C. No Leasing

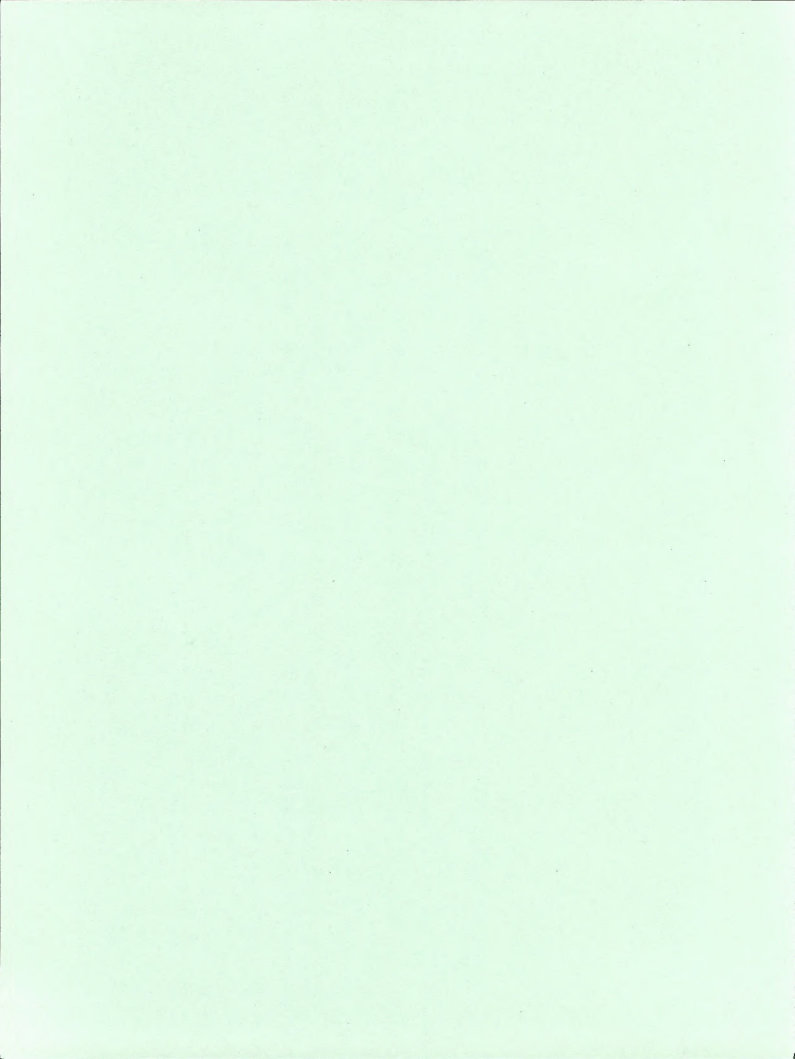
This represents an alternative which would remove Federal oil and gas from availability for leasing and development. It would change management direction so that the issue is resolved in a manner that places highest priority on the preservation of the oil and gas resource and protection of the associated surface resources.



CHAPTER ONE

PURPOSE AND NEED





CHAPTER ONE PURPOSE AND NEED

INTRODUCTION

The Texas Resource Management Plan (RMP) will provide the Bureau of Land Management (BLM) a comprehensive framework for managing the Federally owned minerals in the State of Texas. The RMP establishes program constraints, resource objectives and resource management methods.

Management decisions presented in this plan will remain in effect until the plan is amended, revised or replaced by a new plan. If significant changes occur in the proposed uses of Federal minerals within the state, the RMP will be amended or revised to address those changes.

This document includes proposed RMP management alternatives and a draft Environmental Impact Statement (EIS), fulfilling the Federal Land Policy and Management Act of 1976 (FLPMA) requirements for comprehensive land use planning for public lands. All actions within this document conform to and are designed to meet the requirements of the Mineral Leasing Act for Acquired Lands of August 7, 1947, as amended (30 U.S.C. 351-359).

DESCRIPTION OF PLANNING AREA

The State of Texas is situated in the south-central portion of the contiguous forty-eight states of the United States and is bordered by four American states; Arkansas, Louisiana, New Mexico and Oklahoma and four Mexican states; Chihuahua, Coahuila, Nuevo Leon, Tamaulipas.

The area of the state is approximately 266,807 square miles, which consist of 262,017 square miles of land and 4,790 square miles of inland

water. Texas is divided into 254 counties and has a coastline of 624 miles along the Gulf of Mexico (Map 1-1).

The planning area to be addressed by the Texas RMP/EIS consists of the Federally owned mineral estate administered by the BLM. This area is comprised of the Federal mineral estate underlying other Federal Surface Management Agencies (SMA) lands as well as split-estate (non-Federal surface over Federal minerals) minerals scattered throughout the state.

There are approximately 3.4 million acres of SMA lands within Texas. There is a lesser amount of Federal minerals underlying these surface lands due to the Federal SMAs not acquiring the mineral estate for certain projects or portions of projects. For land use planning purposes however, all acreage within the administrative boundaries of the SMAs are treated as Federal.

The planning area does not include the approximately 1.1 million acres of U.S. Forest Service (USFS) managed lands located in the National Forests and National Grasslands of Texas. The USFS is responsible for preparing their own land use plans for lands and minerals under their administrative control.

All Federal minerals within Texas are classified as acquired. Acquired minerals result from a Federal agency's acquisition of private or state lands and the underlying mineral estate for a specific purpose or project such as a military base or reservoir site.

When acquired lands are no longer needed, the government disposes of these lands through transfers to non-Federal ownership. In some

MAP 1-1



cases, the government retains ownership of the mineral estate under the lands disposed. These severed mineral estates are known as split-estate. For oil and gas leasing purposes the BLM is the SMA for split-estate tracts within Texas.

The Federal SMAs known to possess mineral estate within Texas and their specific areas of responsibility include:

(1) The U.S. Army, Corps of Engineers (COE), Tulsa District for Pat Mayse and Texoma Reservoirs.

(2) The U.S. Army, COE, Fort Worth District for various projects including; Aquilla, Bardwell, Belton, Benbrook, Canyon, Cooper, O.C. Fisher, Georgetown, Granger, Grapevine, Hordes Creek, Lake O' the Pines, Lavan, Lewisville, Navarro Mills, Wright Patman, Joe Pool, Proctor, Sam Rayburn, Ray Roberts, B.A. Steinhagen, Stillhouse Hollow, Somerville, Waco and Whitney Reservoirs.

(3) The U.S. Department of the Interior (DOI), Bureau of Reclamation (BR), Great Plains Region for the Canadian River Project (Sanford Dam and Lake Meredith), Nueces River Project (Choke Canyon Dam and Reservoir), Palmetto Bend Project (Palmetto Bend Dam and Lake Texana) and the San Angelo Project (Twin Buttes Dam and Reservoir).

(4) The U.S. Army, for Fort Bliss, Fort Hood, Fort Sam Houston, Fort Wolters, Camp Bowie, Camp Bullis, Camp Mabry, Camp Swift, Lone Star and Longhorn Army Ammunition Plants and Red River Army Depot.

(5) The DOI, Fish and Wildlife Service (FWS), Region 2, Albuquerque, New Mexico for Anahuac, Aransas, Attwater Prairie Chicken, Balcones Canyonlands, Big Boggy, Brazoria,

Buffalo Lake, Hagerman, Laguna Atascosa, Laguna Grulla, Little Sandy, Lower Rio Grande Valley, McFaddin, Moody, Muleshoe, San Bernard, Santa Ana, Texas Point and Trinity River National Wildlife Refuges (NWRs), Inks Dam, San Marcos and Uvalde National Fish Hatcheries (NFHs).

(6) The DOI, National Park Service (NPS), Southwest Region, Santa Fe, New Mexico for Big Bend and Guadalupe Mountains National Parks (NP), LBJ and San Antonio Missions National Historic Parks (NHP), the Big Thicket National Preserve, Amistad and Lake Meredith National Recreation Areas (NRA), Palo Alto Battlefield and Fort Davis National Historic Sites (NHS), Chamizal National Memorial (NMe), the Alibates Flint Quarries National Monument (NMo) and the Padre Island National Seashore (NS).

(7) U.S. Air Force (USAF) for Bergstrom, Brooks, Carswell, Dyess, Goodfellow, Kelly, Lackland, Laughlin, Randolph, Reese and Sheppard Air Force Bases (AFB), as well as, Laughlin #1 and Seguin Auxiliary Air Fields (AAF).

(8) U.S. Navy (USN) for Corpus Christi, Dallas and Kingsville Naval Air Stations (NAS), Cabaniss, Golaid, Orange Grove and Waldon Naval Auxiliary Landing Fields (NALF), Ingelside Naval Station, the Dallas and McGregor Naval Industrial Reserve Ordnance Plants (NIROP), Kingsville, Dixie and Yankee Target areas and the Space Surveillance Station in Archer County.

(9) The U.S. Department of Justice (DOJ), Bureau of Prisons (BP) for Bastrop, Big Spring, Bryan, Carswell, El Paso, Seguinville, Texarkana and Three Rivers Federal Correctional Institutions (FCI).

(10) U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS) for facilities in the towns of Big Spring, Brownwood, Bushland, College Station, Kerrville, Lubbock, Riesel, Temple and Weslaco.

(11) U.S. State Department, International Boundary and Water Commission, United States and Mexico, United States Section (USIBWC) for Amistad and Falcon Reservoirs.

(12) U.S. Department of Energy (DOE) for the Pantex Facility.

It should be noted that the SMA project lands (surface) far exceed the Federal mineral ownership in the state. Not all minerals were acquired at the time of project development. In addition to the SMA project lands, the planning area includes Federal split-estate minerals located throughout the state. The exact locations of this Federal split-estate are not mapped or easily described due to the metes and bounds lands descriptions used in Texas.

PLANNING PROCESS

The BLM RMP process consists of nine basic steps. This process requires the use of an interdisciplinary team of resource specialists for the completion of each step. The steps described in the planning regulations and followed in preparing this RMP are summarized below. Publication of this document is part of Step 7, Selection of the Preferred Alternative.

Step 1. Identification of Issues

The first step in the planning process is intended to identify resource management problems or conflicts that can be resolved through the planning process. These problems

or conflicts (issues) were identified by the BLM and other agency personnel as well as members of the public. One issue, Federal oil and gas leasing and development, was identified and considered in this document. The BLM published a news release and a Federal Register notice on August 24, 1992, announcing preparation of the Texas RMP and soliciting public involvement and comments. This notice announced the dates of upcoming public meetings and also requested information and interest from the public and industry for Federal coal and other minerals within Texas.

Step 2. Development of Planning Criteria

This step identifies the information needed to resolve issues, formulate and evaluate alternatives and select the preferred alternative. Preliminary decisions are made regarding the kinds of information needed to clarify the issues, the kinds of alternatives to be developed and the factors to be considered in evaluating alternatives and selecting a preferred RMP/EIS.

Step 3. Data and Information Collection

This step involves the collection of various kinds of environmental, social, economic and institutional data needed for completion of the process. This step can include detailed field studies, literature studies or consultation with appropriate professionals. In most cases this process is limited to inventories needed to address the issues.

Step 4. Management Situation Analysis (MSA)

This step calls for deliberate assessment of the current situation. It includes a description of current BLM management guidance, discussion of existing problems and opportunities for solving them and a consolidation of existing data needed to analyze and resolve the

identified issues. The end result of this step is the development of an unpublished companion document known as the MSA. That document is used to develop the Continuing Management Guidance (CMG) and Actions section of the RMP. The MSA is used as a basis for compiling the Affected Environment chapter (Chapter 3) of the RMP. Copies of the MSA are available for review by request.

Step 5. Formulation of Alternatives

During this step, several complete and reasonable resource management alternatives are prepared, including one for no action. Other alternatives are designed to resolve the issue while placing emphasis either on environmental protection or resource production.

Step 6. Estimation of Effects of Alternatives

The physical, biological, economic and social effects of implementing each alternative are estimated in order to allow for a comparative evaluation of impacts. This step, known as the Environmental Consequences section, is Chapter 4 in this RMP.

Step 7. Selection of the Preferred Alternative

Based on the information generated during Step 6, the District Manager identifies and recommends a preferred alternative to the State Director. The Draft RMP/EIS document is then prepared and distributed for public review.

Step 8. Selection of the Resource Management Plan

Based on the results of public review and comment, the District Manager will select and recommend to the State Director various proposals and/or alternatives to comprise the

proposed RMP and publish it along with a final EIS. A final decision is made following both a 60-day Governor's consistency review and a 30-day protest period on the final EIS are completed.

Step 9. Monitoring and Evaluation

This step involves the collection and analysis of long-term resource condition and trend data to determine the effectiveness of the plan in resolving the identified issues and to ensure that implementation of the plan is achieving the desired results. Monitoring continues from the time the RMP is adopted until changing conditions require a revision of the whole plan or any portion of it.

PLANNING ISSUES, CRITERIA AND MANAGEMENT CONCERNS

The BLM planning regulations equate land-use planning with problem solving and issue resolution. An issue is defined as an opportunity, conflict or problem regarding the use or management of public land and resources.

Planning criteria are the standards, rules and measures used for data collection and alternative formulation, which will guide final plan selection. Planning criteria are taken from appropriate laws and regulations, BLM manuals and directives and concerns expressed in meetings and consultations, both with the public and other agencies.

Management concerns are those non-issue related procedures or land-use allocations which have proven, during the preparation of this RMP/EIS, to need modification. Management concerns focus on use conflicts, requirements or conditions that cannot be resolved administratively and did not, during initial public scoping, appear to meet the

criteria to qualify as a planning issue. These concerns were or are identified for resolution in the RMP.

The issue proposed for examination as a result of the scoping process for the Texas RMP was identified based upon the judgment of the planning team and BLM management consultation. The issue will address the anticipated concerns of the public, industry and other Federal, state and local agencies. Further refinement of this issue, deletion or expansion of a portion of the issue or inclusion of other as yet unknown planning issues may occur during the planning process.

ISSUE: Leasing and development of Federal oil and gas in Texas.

The issue is further broken down into the following leasing categories:

1. Open-Subject to Standard Terms and Conditions (STC).

These areas in the planning area will be open for oil and gas leasing and development subject to standard lease terms and conditions. These are the areas, to be determined through the RMP/EIS process, where the terms and conditions of a standard lease form are sufficient to protect other land uses and/or resource values.

2. Open-Subject to Seasonal or Other Minor Constraints.

These areas in the planning area will be open for oil and gas leasing and development subject to minor constraints such as seasonal restrictions (wildlife, recreation, etc.). These areas, to be determined by the RMP/EIS process, are where moderately restrictive lease

stipulations may be required to mitigate potential impacts to other land uses or resource values.

3. Open-Subject to No Surface Occupancy (NSO) and Similar Major Constraints.

These areas in the planning area will be open for oil and gas leasing and development subject to major constraints such as NSO stipulations on areas larger than 40 acres in size or more than 1/4 mile in width. These are the areas, to be determined in the RMP/EIS process, that require highly restrictive lease stipulations in order to mitigate potential impacts to other land uses or resource values.

4. Closed to Leasing.

These areas in the planning area will be closed to leasing. These areas, to be documented by the RMP/EIS process, are where other land uses or resource values cannot be adequately protected by the most restrictive lease stipulations and appropriate protection can only be ensured by closing the area to leasing. The RMP/EIS will identify closed areas by category of closure; i.e., discretionary or nondiscretionary closures. A nondiscretionary closure is established by legislative mandate while a discretionary closure is the result of an agency management decision.

MANAGEMENT DIRECTION

Existing leases may contain stipulations that are either too restrictive or not restrictive enough in terms of the goals and objectives established in the plan. Although lease terms cannot be modified by the RMP, the plan does allow the existing lease holders the opportunity to voluntarily conform with proposed stipulations contained in the plan.

PLANNING CRITERIA

The following describes the proposed planning criteria that would be used in addressing the currently identified issues. All alternatives considered for management of the identified issues or addressing the issues must satisfy the following planning criteria:

1. All alternatives must comply with laws, executive orders, policy and regulations.
2. For each alternative, the resource outputs must be reasonable and achievable with available technology.
3. The RMP will describe the specific circumstances within which lease stipulations would be subject to waiver. Those lease stipulations not subject to waiver will also be described.
4. All alternatives will evaluate and consider long term benefits to the public in relation to short term benefits.
5. Each alternative will provide for the orderly development of leasable minerals while keeping environmental impacts to a minimum.
6. Surface actions not controlled by or under the authority of the BLM will not be addressed by the RMP/EIS. Surface uses authorized by the surface owner or the SMA are not subject to discussion in the RMP/EIS.

ENVIRONMENTAL CONCERNS

Environmental concerns or components normally addressed by a BLM land use plan and EIS are generally associated with surface resources or uses. In the case of the Texas RMP, the BLM is addressing the Federal mineral estate. Surface uses and resources will

be addressed as they conflict with or are impacted by the development of the federal minerals.

Environmental Concerns Considered but Dropped from Further Study Include:

1. Wild Horses and Burros

Wild and free-roaming horses and burros do not occur in Texas and therefore, will not be addressed.

2. Wilderness

BLM managed wilderness does not occur in Texas and therefore, will not be addressed.

3. Forestry, Livestock Grazing, Outdoor Recreation and Visual Resource Management

There is no BLM managed surface estate occurring within Texas. The BLM resource management programs concerning forestry, livestock grazing, outdoor recreation and visual resource management do not apply in Texas. Private, state or SMA forestry, livestock grazing, outdoor recreation and visual resources occurring on a particular tract of mineral estate will be addressed in a site specific manner.

Environmental Concerns Considered in this EIS Include:

1. Air Quality

Air quality concerns include dust and emissions associated with road and drill pad construction and drilling operations. The potential to create or release concentrations of harmful gases (e.g., hydrogen sulfide,) at drill sites exists. Air quality will be addressed in this document.

2. Water Resources

The development of oil and gas resources has the potential to affect surface and groundwater through surface erosion, contamination of streams, contamination of aquifers, production of brine waters and the introduction of toxic substances into the environment. Water resources will be evaluated and considered as an environmental component in this document.

3. Soils

The construction of access roads, drill pads and pipelines will result in soil disturbance. Soil disturbance attributable to the proposed action will be a consideration of this plan.

4. Vegetation

The construction of access roads, drill pads and pipelines will result in the removal of vegetation. The removal of vegetation will be evaluated and addressed as an environmental component in this document. The protection of wetland and riparian vegetation is of particular concern to the BLM.

BLM guidance and policy as well as Executive Order (E.O.) 11990 (Protection of Wetlands) provide direction for BLM's protection of wetland and riparian vegetation.

5. Wildlife

The construction of access roads, drill pads and pipelines could result in the loss of wildlife habitat. Drilling and production operations adjacent to wildlife habitats during critical seasons of a particular species' life cycle could result in habitat avoidance by the local population of that species.

6. Special Status Species (SSS)

The construction of access roads, drill pads and pipelines will not result in the loss of SSS or their habitats. The protection of SSS and their habitats is of particular concern to the BLM.

Protection of Federal proposed and listed threatened and endangered (T&E) plant and animal species and their habitats, as well as designated and proposed critical habitats, from destruction and disturbance which results from a Federal action (oil and gas leasing) is required by BLM policy and the Endangered Species Act (ESA) of 1973, as amended. In addition, it is BLM policy to manage for the conservation of candidate (category 1 and 2) and state listed plant and animal species. These candidate species and those referenced above as T&E are hereafter referred to as SSS.

7. Cultural/Paleontological Resources

Protection of cultural and paleontological resources from damage or destruction resulting from a Federal action (oil and gas leasing) is required by BLM policy and a number of laws. As such, these resources will be evaluated and be considered as environmental components to be addressed in the RMP/EIS.

8. Minerals

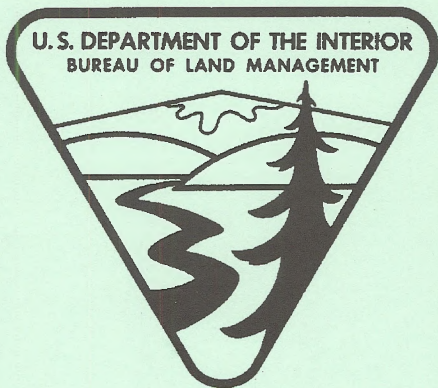
The alternatives addressed in this RMP/EIS may limit development of Federal mineral resources in the State of Texas. For this reason the impacts of each alternative on oil and gas development will be addressed in this RMP/EIS.

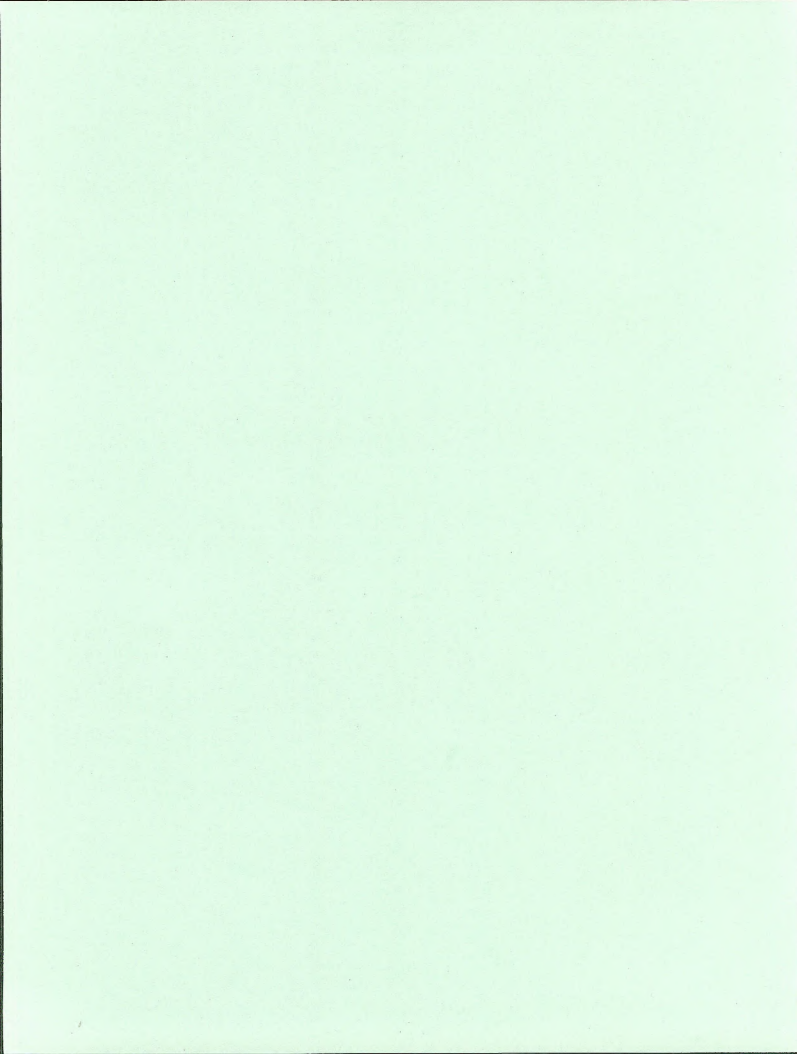
9. Socio-Economics

Oil and gas leasing and development could create impacts to the states social structure through direct impacts to economic components which result from oil and gas. There could be effects on the work force and economy by a decision to lease or not lease Federal oil and gas. For these reasons socio-economics will be addressed in this EIS.



CHAPTER TWO
PROPOSED
RESOURCE MANAGEMENT PLAN





CHAPTER TWO ALTERNATIVES

INTRODUCTION

Three alternatives were developed for resolution of the issue described in the previous chapter. Development of the alternatives was guided by the planning criteria, public consultation, coordination with other agencies and evaluation by BLM. The alternatives represent the most reasonable range of options possible due to the lack of surface resource jurisdiction and fragmentation of minerals ownership.

This chapter contains management guidance applicable to all three alternatives under the heading "Continuing Management Guidance" and a description of each of the three alternatives in relation to affected resources under the "Alternatives" heading.

The Texas RMP/EIS is not a land use plan for private, state or other Federal SMA resources. BLM has no surface jurisdiction over split-estate Federal minerals administered by the agency, nor does the BLM have surface land use authority concerning Federal SMA lands. Under the various Federal mineral leasing laws, regulations and programs, the Federal SMA must grant consent to mineral leasing and subsequent minerals development prior to the BLM offering the tract(s) for lease. The SMA retains all authority to manage their programs and surface resources while management of the mineral estate is vested with the BLM.

CONTINUING MANAGEMENT GUIDANCE (CMG)

This section describes resource management guidance that is applicable to, and therefore

constitutes a part of, all three alternatives. CMG is provided by laws, executive orders, regulations, DOI manuals, BLM manuals and BLM instruction memoranda which will be followed regardless of which alternative is selected. CMG also includes decisions from preceding land use plans, cooperative agreements or memoranda of understanding with other state and Federal agencies.

The BLM resource management programs which may be affected by management decisions resulting from the RMP/EIS or which may influence the final RMP decisions are: 1) the wildlife program, which includes T&E species responsibilities for both plants and animals; 2) the cultural resources program, which involves paleontological, archeological and historic resources management responsibilities; and 3) the minerals management program, which involves all mineral resources and their management.

Current management of these programs can best be described as responsive and custodial. Leasing of the mineral estate, specifically for oil and gas production, has been in response to industry demands. These two situations will help the reader understand the program descriptions that follow.

1. WILDLIFE (INCLUDING SSS)

The function of the BLM's wildlife management program in Texas is to provide support for mineral actions. The program activities in Texas are limited to participation in team efforts to prepare environmental analyses, special status species (SSS, state and

Federal T&E species and etc.) evaluations, wetland/riparian evaluations and development of wildlife resource stipulations and conditions of approval (COA).

Federal minerals under private surface or Federal surface managed by another Federal agency or licensed by another Federal agency to a state or local agency for surface management purposes are the most common situations encountered in BLM's wildlife management program in Texas. In these situations BLM's wildlife responsibilities in Texas do not begin until a BLM mineral action (leasing and/or development) is proposed.

Wildlife habitats, common wildlife species and special status plant and animal species are very diverse and numerous in a large state such as Texas. Approximately 70 species of plants and animals are currently Federally listed as T&E in the state. There are many more species that are Federal candidate species (category 1 and 2) and species listed by the State of Texas as T&E. Only through close site specific coordination with the four Ecological Services Offices of the U.S. Department of the Interior, Fish and Wildlife Service (FWS), FWS State Administrator's office and the Texas Parks and Wildlife Department (TPWD) is the BLM able to keep abreast of the ever changing habitat and SSS concerns throughout Texas.

Some additional wildlife agency coordination will be performed for mineral leasing after this RMP is completed. The uncertainty concerning the location of the split-estate minerals in Texas makes some pre-leasing/post-RMP wildlife agency coordination necessary.

Also, every post-leasing action which would result in surface disturbing activities would be analyzed in a BLM environmental assessment (EA) and an "Evaluation of Special Status Species, Wetlands and Riparian Zones". Agency coordination letters would be mailed to

the TPWD and the appropriate FWS office on all post-leasing oil and gas actions which would result in surface disturbing activities. Such surface disturbing actions would include Applications for Permit to Drill (APD) or Sundry Notices submitted for actions on Indian or Federal oil and gas leases. Site specific agency coordination would include a discussion of lease stipulations and notices.

The ESA of 1973, as amended, the Migratory Bird Treaty Act, E.O. 11990, Protection of Wetlands, BLM policies regarding protection and management of wetlands and riparian areas and information received from the FWS and the TPWD have influenced the development and application of the stipulations and lease notices (LN). LN's are advisory in function and do not mandatorily require any action.

2. CULTURAL RESOURCES

ARCHEOLOGICAL/HISTORIC

The cultural resource program activities in Texas consist of development of environmental analysis reports; site specific evaluations or inventories of cultural resources in support of mineral leasing and development, development of terms and conditions of impact mitigation or impact avoidance, and consultations with state agencies and Indian tribes. Program involvement associated with mineral leasing under other Federal SMA properties is limited to coordination and consultation with other Federal and state agencies and Federally recognized Indian tribes.

Consultation directly with Federally recognized Indian tribes is regularly performed to comply with the American Indian Religious Freedom Act, 42 United States Code (U.S.C.) 1996). These consultations do not depend upon tribal ownership of mineral rights in a development area, but result from tribal history, sacred or

ceremonial areas or unmarked graves possible in an area of development. Negotiations with specific Indian tribes will also be conducted when any newly discovered Indian graves are claimed for repatriation in accordance with the Native American Graves Protection and Repatriation Act of 1990 (Public Law (P.L.) 101-601).

PALEONTOLOGICAL RESOURCES

The paleontological resource program activities in Texas consists of development or review of environmental analysis reports; site specific evaluations or inventories of paleontological resources in support of mineral leasing and development, and application of terms and conditions for impact mitigation or to avoid impacts.

3. MINERALS

Federal minerals occurring in commercial quantities in Texas include oil and gas and coal or lignite. Federal lignite leasing in Texas was addressed in the Draft and Final Camp Swift Lignite Leasing EIS of 1980 and is included as CMG.

At this time the BLM's fluid minerals management program consists of oil and gas leasing and the associated development and operations oversight. Currently there are approximately 350,000 acres of the BLM administered Federal mineral estate in Texas under oil and gas lease. The Fluid Minerals Assessment completed by the BLM indicates that most of the state is in a moderate oil and gas development potential category.

Procedures for reviewing oil and gas lease applications vary depending upon the category of surface ownership. Proposals to lease split-estate minerals require the BLM to prepare a site-specific EA and assure that

necessary surface protection stipulations are attached to the lease. Procedures for leasing on other SMA minerals are similar to split-estate procedures except that the SMA is contacted for approval to lease and also for identification of specific agency surface protection stipulations. The BLM is responsible for National Environmental Policy Act (NEPA) compliance documentation which could include preparing a site-specific EA that addresses the proposal.

All Federal oil and gas leasing and lease operations in Texas are conducted following procedures established and presented in 43 Code of Federal Regulations (CFR) 3100. Prior to operations, a site specific environmental analysis of the proposed well site may result in additional considerations before approval of an APD.

Lease activities in Texas involve on-site inspections before approving an APD, drilling plan review and lease operations inspection and enforcement. Lease operations are regulated by lease terms, regulations and stipulations that may be attached to the lease to protect specific resource values identified by an EA or EIS.

Geophysical operations within Texas are not controlled or authorized by the BLM. Each SMA and surface owner negotiates and controls surface uses which includes access for geophysical exploration activities.

ALTERNATIVES

Both NEPA regulations and the BLM's land use planning regulations under 43 CFR 1600 require the formulation of management alternatives. Each proposed alternative represents a different comprehensive land use plan to guide future management of lands and resources. One management alternative must represent "no action", which means a

continuation of present resource allocation levels and management practices. Different alternatives are developed as solutions to questions and management concerns. Because only one resource issue, oil and gas leasing and development, is being addressed by the RMP/EIS the multiple-resource trade-offs which normally constitute the preferred alternative are not applicable to this RMP.

Three alternatives have been developed to address the issue of Federal oil and gas leasing and development within Texas. These alternatives consist of differing management practices resulting in three levels of mitigation of impacts to surface resource values which could result in three different levels of potential oil and gas development. The baseline Reasonable Foreseeable Development (RFD) scenario was prepared based upon an assumption of continuation of present management (Alternative A). In order to analyze potential impacts and/or effects of the other two alternatives, RFDs will be prepared utilizing oil and gas development levels derived from those differing management practices and levels of mitigation.

The three alternatives are as follows:

Alternative A. Continuation of Present Management (No Action)

Split-Estate Lands

Under this alternative new leases and expired leases that are reissued would be leased under "Standard Terms and Conditions" (STC). Mandatory stipulations (those required by law) would be incorporated into each lease where those stipulations apply.

SMA Lands

Most SMAs in Texas have developed lease stipulations for the lands under their jurisdiction. There are currently more than 80

Federal projects or installations potentially subject to oil and gas leasing in Texas where BLM has minerals management responsibility. Under this alternative new leases and expired leases that are reissued would be leased with the stipulations identified by the SMA.

Mineral leases would continue to be issued with the standard oil and gas lease provisions as well as with surface resource protection stipulations required by executive order, law, regulation or policy. Approximately 1,774,545 acres would be open to leasing. Approximately 1,629,753 acres would be closed to leasing.

Alternative B. Intensive Surface Protection (Preferred Alternative)

Split-Estate Lands

Under this alternative new leases and expired leases that are reissued would be leased with surface resource protection stipulations. Mandatory stipulations would be incorporated into each lease where those stipulations apply. In addition, this alternative will include optional stipulations where resource values exist that warrant special protection.

SMA Lands

Under this alternative all new leases and expired leases that are reissued would be leased with stipulations currently identified by the SMA. Additional stipulations may be applied to these SMA lands where the BLM determines additional stipulations may be necessary to protect resource values warranting protection greater than provided by the SMA stipulations.

Under this alternative mineral leases would continue to be issued with the standard oil and gas lease provisions, with surface resource protection stipulations required by executive order, law, regulation or policy, as well as additional multi-resource protection stipulations

needed to protect valuable surface resources. Approximately 1,774,545 acres would be open to leasing. Approximately 1,629,753 acres would be closed to leasing. Additional multi-resource protection lease stipulations would be required on approximately 30,854 acres.

Alternative C. No Leasing

Under this alternative the BLM would not offer new oil and gas leases. Those lands currently under lease would not be re-offered for lease following lease expiration. Those lands held by production would not be re-offered following loss of production and subsequent lease expiration.

This alternative places primary emphasis on removing Federal oil and gas from availability for development. This alternative changes management direction so that the issue is resolved in a manner that places highest priority on the protection of surface resources from disturbance caused by Federal oil and gas development.

Mineral leases would not be issued. Approximately 3,404,298 acres of Federal oil and gas would be closed to leasing by the end of the life of the plan.

FEDERAL OIL AND GAS LEASE STIPULATIONS

A Federal oil and gas lease is a contract between the Federal government and an individual or corporation (lessee) which allows the lessee to extract oil and gas from the Federal mineral estate for a percentage (royalty) of the gross value.

The terms of the lease are considered contractual obligations of the lessee and are standardized on all Federal oil and gas leases.

The terms and conditions of an oil and gas lease provide general protection of surface and subsurface resources for normal operations and are known as the Standard Terms and Conditions (STC). A copy of the STC of a Federal oil and gas lease are presented in Appendix 3. The Federal government also utilizes leasing stipulations to protect unique values or important resources when it is felt that the STC are not adequate.

Proposals to lease split-estate minerals require the BLM to prepare a site specific EA and assure that necessary surface protection stipulations are attached to the lease. Procedures for leasing on other SMA minerals are similar to split estate procedures except that the SMA is contacted for consent to lease and also for identification of specific agency surface protection stipulations. Stipulations to a lease involve additional restrictions required of the lessee for conduct of operations on a lease. Stipulations are attached to a lease at the time of lease offer, providing the potential lessee the opportunity not to bid on the lease if these restrictions are not agreeable.

The Mineral Leasing Act for Acquired Lands, 30 U.S.C. 351, requires that the SMA stipulations must be included on a lease. Further, as presented in 43 CFR 3101.7-1(a) "Acquired lands shall be leased only with the consent of the surface management agency, which upon receipt of a description of the lands from the authorized officer, shall report to the authorized officer that it consents to leasing with stipulations, if any, or withholds consent or objects to leasing." Additional, more restrictive stipulations can be added by the BLM. Specific BLM action in regard to SMA stipulations is mandated by 43 CFR 3101.7-2(a) "Where the surface managing agency has consented to leasing with stipulations and the Secretary decides to issue (a lease), the authorized officer shall

incorporate the stipulations into any lease which it may issue. The authorized officer may add additional stipulations."

Exceptions to a lease stipulation, waiver of a lease stipulation or modification of a lease stipulation are explained in the Federal regulations at 43 CFR 3101.1-4. Generally, an exception, waiver or modification may be approved if the record shows that circumstances or protected resource values have changed or if the lessee can demonstrate that operations can be conducted without causing unacceptable impacts and that less restrictive stipulations will protect the public interest. Exceptions, waivers and modifications can only be granted by the Authorized Officer. If the proposed exception, waiver or modification is inconsistent with the land use plan, the plan will be amended or changed or the exception, waiver or modification will be disallowed.

Exceptions are considered on a case by case basis and are subject to an environmental analysis. Exception to a leasing stipulation will be granted by the Authorized Officer if the reason for the exception is consistent with that analysis. No public notice is required for exceptions to lease stipulations which conform to the plan. Exceptions which do not conform to the plan may be granted only upon plan amendment and public notification.

A stipulation waiver is the complete elimination of a stipulation from a particular lease contract. A stipulation is waived by the Authorized Officer after preparation of an EA and a decision is made that the stipulation in question is no longer required for a particular lease. The decision to waive a substantial stipulation requires a plan amendment and a 30 day public notice period prior to waiver.

Modifications to a lease stipulation are made if and when resource management determines the stipulation is no longer effective as written. This situation could occur when new information, obtained by inventory or monitoring, etc. indicates that the protective measure is unnecessarily restrictive. Modification of a stipulation requires the preparation of an EA to determine the potential impacts and/or plan amendment or maintenance needs. If the modification is determined to be substantial by the Authorized Officer, a 30 day public notice period prior to modifying the lease stipulation is required.

Stipulations attached to a lease as a condition of consent by a SMA are not subject to exception, waiver or modification by the BLM.

BUREAU OF LAND MANAGEMENT STIPULATIONS

Stipulations utilized within the Tulsa District include both mandatory and optional stipulations. A mandatory stipulation is one which addresses protection of a resource which the BLM is required by law, regulation or policy to protect and which the BLM feels STC would not offer sufficient protection. A mandatory stipulation would be applied under Alternative A and Alternative B.

Mandatory stipulations include:

ORA-1, Floodplain Protection Stipulation

"All or portions of the lands under this lease lie in and or adjacent to a major watercourse and are subject to periodic flooding. Surface occupancy of these areas will not be allowed without the specific approval, in writing, by the Bureau of Land Management."

This stipulation is a result of E.O. 11988, Floodplain Management, of May 24, 1977.

ORA-2, Wetland/Riparian Stipulation

"All or portions of the lands under this lease contain wetland and/or riparian areas. Surface occupancy of this tract will not be allowed without the specific approval, in writing of the Bureau of Land Management. Impacts or disturbance to wetlands and riparian habitats which occur on this lease, must be avoided or mitigated. The mitigation shall be developed during the application for permit to drill process."

The wetland/riparian stipulation is mandated by E.O. 11990, Protection of Wetlands, of May 24, 1977.

Optional stipulations would be applied under Alternative B to protect a resource value or other land use which would be potentially impacted by normal oil and gas lease operations. These stipulations are optional in the sense that they are not mandated by law or regulation. They will be used only when the value of the resource warrants protection.

Optional stipulations include:

ORA-3, Season of Use Stipulation

"Surface occupancy of this lease will not be allowed from date, through date, without the specific approval in writing, from the Authorized Officer of the Bureau of Land Management."

This stipulation restricts the time period that the lessee can be on the lease. This is usually only necessary when the restriction would result in more than a 60 day delay in commencing operations (by regulation BLM can specify up to a 60 day delay as a result of the APD analysis). Most season of use restrictions involve wildlife seasonal use requirements or recreation use conflicts with

drilling activities.

ORA-4, No Surface Occupancy (NSO)

"Surface occupancy of this lease will not be allowed."

This stipulation prohibits surface use to protect a resource or use that is not compatible with oil and gas development. The tract could be leased for inclusion in a drilling unit and may be drilled directionally from an off-site location where occupancy is allowed.

NM-9, No Surface Occupancy, Pooling Purposes Only

This stipulation prohibits surface use as well as directional drilling into Federal minerals. This stipulation is used to protect a resource or use that is not compatible with oil and gas development. The tract could be leased for inclusion in a drilling unit to meet an operators spacing requirements.

NM-10, Coal Protection

This stipulation requires that any Federal oil and gas operator must coordinate development with the Federal coal lessee. This stipulation is used to protect the value of the Federal coal resource.

LEASE NOTICES (LN)

A LN provides more detailed information concerning limitations that already exist in law, lease terms, regulations or operational orders. A LN also addresses special items the lessee should consider when planning operations, but does not impose new or additional restrictions. LN's attached to leases should not be confused with Notices to Lessees (NTL).

LN's would be applied under Alternative B and include:

LN-1, Threatened and Endangered Species

"According to preliminary information all or portions of this lease area could contain Federal and/or state listed threatened or endangered species and/or their habitats. Any proposed surface disturbing activity may require an inventory and consultation with the FWS and/or the state wildlife agency. The consultation could take up to 180 days to complete. Surface occupancy could be restricted or not allowed as a result of the consultation. Appropriate modifications to the imposed restrictions will be made for the maintenance and operations of producing oil and gas wells."

CONDITIONS OF APPROVAL AND GENERAL REQUIREMENTS FOR OIL AND GAS OPERATIONS ON FEDERAL AND INDIAN LEASES (KANSAS, OKLAHOMA AND TEXAS)

Additional BLM requirements to protect a resource or value that does not affect the lessee's rights or restrict location on the lease can be imposed as a COA of the APD or as a general requirement for operating a Federal oil and gas lease.

Initially these resource protection measures are developed as COAs and then, should they be found to be generally applied to all APDs, they become part of the list of General Requirements for Oil and Gas Operations on Federal Leases (Kansas, Oklahoma and Texas).

Examples of such resource protection measures are as follows:

- "All open pits and tanks being used in conjunction with the development and production of this lease will be netted or

otherwise covered no later than four (4) days after final drilling depth is achieved and until such time as they are removed and/or filled and reclaimed. The recommended coverings include hard covers or a screen material of small enough mesh size so as to prevent the entry and death of migratory birds. The U.S. FWS, Division of Law Enforcement, has prepared materials which provide guidelines for covering oil field pits and tanks".

Note: The granting of four (4) working days for completion of covering or netting pits and/or tanks in no way limits your responsibility should migratory birds be found dead in the tanks or pits within the four (4) day period or during the actual drilling phase.

- "Open-vent exhaust stacks on production equipment (heater/treater, separator and dehydrator units), installed for use with this well, will be constructed, modified and/or otherwise equipped to prevent birds and bats from entering and to the extent practical, to discourage perching and nesting. These measures must be completed prior to production from this well passing through such equipment."

- "All new overhead electrical lines needed for the drilling or production phase of this well will be modified to help minimize accidental deaths of migratory birds. The poles and the wires will be modified to help minimize the likelihood of bird electrocutions and collisions. Guidelines can be found in a wide variety of publications. Two such sources of technical information are as follows: 'Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1981' and 'Mitigating Bird Collisions With Power Lines: The State of the Art in 1994'. Also, the power company or cooperative that serves your area should be able to provide technical advice."

A summary of how stipulations would be applied for Alternative A is presented in Table 2-1 and for Alternative B in Table 2-2.

SURFACE MANAGEMENT AGENCY STIPULATIONS

Federal mineral resources under SMA lands within Texas are subject to each SMA's specific leasing stipulations regardless of alternative. Copies of the SMAs' oil and gas leasing stipulations are contained in Appendix 3. Generally, these SMA stipulations can be divided into three categories; no surface occupancy (NSO), no surface occupancy with no directional drilling allowed (NSO/ND); NSO with directional drilling allowed (NSO/DD) and NSO described by elevation or surface use if suitable non-agency lands are included in the same drilling unit (NSO/ELEV). The SMAs normally base lease stipulations to the surface land use or allocation at the particular site or installation.

NSO/ND, No Surface Occupancy and No Drilling

This stipulation, common to the COE and the BR, is designed to protect facilities such as dams, embankments and other areas from damage by oil and gas operations. This

stipulation prohibits surface occupancy and directional drilling by the lessee under restricted areas. This stipulation allows the identified area to be included in a lease for the purpose of becoming a part of a drilling unit so that the United States will share in the royalty.

NSO/DD No Surface Occupancy, Open for Directional Drilling

This stipulation is used by SMAs to protect surface resource values and uses from drilling activities. This stipulation is applied to public use areas, recreation areas, state wildlife and waterfowl refuges, historical sites, trails, roads and military training areas. Directional drilling is permitted from outside the identified areas where occupancy is allowed.

NSO/ELEV No Surface Occupancy based on Elevation

This stipulation is used by the COE in combination with, "No drilling on Government owned surface where alternative surface ownership is available within the same drilling unit" to protect the integrity of their reservoirs at a specific level based upon lake elevation. Normally, this stipulation is subject to negotiation between the SMA and the lessee at the time of operational plan development.

TABLE 2-1
FEDERAL LANDS OPEN FOR OIL AND GAS LEASING WITH STIPULATIONS
UNDER ALTERNATIVE A

<u>SMA PROJECT/AREA</u>	<u>ACRES</u>	<u>NSO/ND</u>	<u>NSO/DD</u>	<u>NSO/ELEV</u>	<u>ORA-1</u>	<u>ORA-2</u>
Pat Mayse Lake	18,928	1,200	10,000			
Texoma Lake	193,500	4,250	85,500			
Total TD COE	212,428	5,450	95,500			
Aquilla Lake	12,395	1,200	9,180			
Bardwell Lake	8,157	700	7,447			
Belton Lake	32,218	500	25,775			
Benbrook Lake	11,275	950	10,526			
B.A. Steinhagen	22,800	500	18,554			
Canyon Lake	14,568	900	14,516			
Cooper Lake	57,328	1,500	37,045			
Georgetown Lake	5,830	300	4,315			
Granger Lake	15,303	2,500	12,425			
Grapevine Lake	17,761	1,800	17,716			
Hords Creek Lake	3,027	500	2,475			
Joe Pool Lake	20,776	2,800	17,775			
Lake O' the Pines	45,095	1,445	38,200			
Lavon Lake	37,565	1,500	36,500			
Lewisville Lake	45,506	2,500	39,080			
Navarro Mills Lake	14,216	730	12,925			
O.C. Fisher Lake	18,140	1,500	17,155			
Procter Lake	15,944	1,835	15,400			
Sam Rayburn Lake	159,754	2,650	146,324			
Ray Roberts Lake	48,353	2,005	39,700			
Somerville Lake	32,729	3,570	27,800			
Stillhouse Hollow Lake	16,181	2,130	13,755			
Waco Lake	21,327	3,357	21,327			
Whitney Lake	53,194	2,413	53,194			
Wright Patman Lake	157,526	2,523	157,526			
Total FW COE	886,968	42,308	796,635			
Choke Canyon Reservoir	26,000	*	**			
Palmetto Bend Lake	11,000	*	**			
Lake Meredith	700	700				
Total BR	37,700	700				

* NSO/ND restrictions will apply within area of the project where the U.S. owns 100 percent fee title mineral interest.

** BR Project General Stipulations will apply in project areas where less than the full mineral interest has been acquired.

TABLE 2-1 (Continued)
FEDERAL LANDS OPEN FOR OIL AND GAS LEASING WITH STIPULATIONS
UNDER ALTERNATIVE A

SMA PROJECT/AREA	ACRES	NSO/ND	NSO/DD	NSO/ELEV	ORA-1	ORA-2
Fort Bliss	125,295		125,295			
Fort Hood	208,712		208,712			
Fort Wolters	3,985		3,985			
Camp Bowie	3,858		3,858			
Camp Bullis	27,880		27,880			
Camp Swift	11,740		11,740			
Lone Star Army						
Ammunition Plant	15,546		15,546			
Longhorn Army						
Ammunition Plant	8,492		8,492			
Red River Army						
Depot	19,081					
Bergstrom AFB	3,215		3,215			
Dyess AFB	5,366		5,366			
Laughlin AFB	3,911		3,911			
Laughlin No. 1 AAF	1,200		1,200			
Randolph AFB	2,893		2,893			
Reese AFB	2,455		2,455			
Seguin AAF	961		961			
Sheppard AFB	4,160		4,160			
Cabaniss NALF	800		800			
Corpus Christi NAS	2,593		2,593			
Kingsville NAS	3,955		3,955			
McGregor NIROP	9,789		9,789			
Waldon NALF	640		640			
Total DOD	466,527		447,446			

Note: All leasing would be subject to military commander stipulations.

Pecan Genetics and Improvement		
Research Laboratory	84	84
Conservation and Production		
Research Laboratory	1,531	1,531
Livestock Insects Laboratory	35	35
Grassland, Soil and Water		
Research Laboratory	1,272	1,272
Total ARS	2,922	2,922

TABLE 2-1 (Continued)
FEDERAL LANDS OPEN FOR OIL AND GAS LEASING WITH STIPULATIONS
UNDER ALTERNATIVE A

<u>SMA PROJECT/AREA</u>	<u>ACRES</u>	<u>NSO/ND</u>	<u>NSO/DD</u>	<u>NSO/ELEV</u>	<u>ORA-1</u>	<u>ORA-2</u>
Amistad Reservoir	65,000	*		**		
Falcon Reservoir	87,000	*		***		
Total USIBWC	152,000					

* NSO/ND within 2,300 feet of the centerline of the dam embankment.

** NSO below the 1,144.3 foot elevation traverse (USIBWC Stip. No. 1).

*** NSO below the 307 foot elevation traverse (USIBWC Stip. No. 1).

<u>Pantex</u>	<u>16,000</u>	<u>16,000</u>	
Total DOE	16,000	16,000	

GRAND TOTAL	1,774,545	64,458	1,342,503
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TABLE 2-2
FEDERAL LANDS OPEN FOR OIL AND GAS LEASING WITH STIPULATIONS
UNDER ALTERNATIVE B

<u>SMA PROJECT/AREA</u>	<u>ACRES</u>	<u>NSO/ND</u>	<u>NSO/DD</u>	<u>NSO/ELEV</u>	<u>ORA-1</u>	<u>ORA-2</u>	<u>ORA-3</u>
Pat Mayse Lake	18,928	1,200	10,000				8,925
Texoma Lake	193,500	4,250	85,500				11,429
Total TD COE	212,428	5,450	95,500				20,354
Aquilla Lake	12,395	1,200	9,180				
Bardwell Lake	8,157	700	7,447				
Belton Lake	32,218	500	25,775				
Benbrook Lake	11,275	950	10,526				
B.A. Steinhagen	22,800	500	18,554				4,000
Canyon Lake	14,568	900	14,516				
Cooper Lake	57,328	1,500	37,045				
Georgetown Lake	5,830	300	4,315				
Granger Lake	15,303	2,500	12,425				6,500
Grapevine Lake	17,761	1,800	17,716				
Hords Creek Lake	3,027	500	2,475				
Joe Pool Lake	20,776	2,800	17,775				
Lake O' the Pines	45,095	1,445	38,200				
Lavon Lake	37,565	1,500	36,500				
Lewisville Lake	45,506	2,500	39,080				
Navarro Mills Lake	14,216	730	12,925				
O.C. Fisher Lake	18,140	1,500	17,155				
Procter Lake	15,944	1,835	15,400				
Sam Rayburn Lake	159,754	2,650	146,324				
Ray Roberts Lake	48,353	2,005	39,700				
Somerville Lake	32,729	3,570	27,800				
Stillhouse Hollow Lake	16,181	2,130	13,755				
Waco Lake	21,327	3,357	21,327				
Whitney Lake	53,194	2,413	53,194				
Wright Patman Lake	157,526	2,523	157,526				
Total FW COE	886,968	42,308	796,635				10,500
Choke Canyon Reservoir	26,000	*	**				
Palmetto Bend Lake	11,000	*	**				
Lake Meredith	700	700					
Total BR	37,700	700					

* NSO/ND restrictions will apply within area of the project where the U.S. owns 100 percent fee title mineral interest.

** BR Project General Stipulations will apply in project areas where less than the full mineral interest has been acquired.

TABLE 2-2 (Continued)
FEDERAL LANDS OPEN FOR OIL AND GAS LEASING WITH STIPULATIONS
UNDER ALTERNATIVE B

<u>SMA PROJECT/AREA</u>	<u>ACRES</u>	<u>NSO/ND</u>	<u>NSO/DD</u>	<u>NSO/ELEV</u>	<u>ORA-1</u>	<u>ORA-2</u>	<u>ORA-3</u>
Fort Bliss	125,295		125,295				
Fort Hood	208,712		208,712				
Fort Wolters	3,985		3,985				
Camp Bowie	3,858		3,858				
Camp Bullis	27,880		27,880				
Camp Swift*	11,740		11,740				
Lone Star Army Ammunition Plant	15,546		15,546				
Longhorn Army Ammunition Plant	8,492		8,492				
Red River Army Depot	19,081						
Bergstrom AFB	3,215		3,215				
Dyess AFB	5,366		5,366				
Laughlin AFB	3,911		3,911				
Laughlin No. 1 AAF	1,200		1,200				
Randolph AFB	2,893		2,893				
Reese AFB	2,455		2,455				
Seguin AAF	961		961				
Sheppard AFB	4,160		4,160				
Cabaniss NALF	800		800				
Corpus Christi NAS	2,593		2,593				
Kingsville NAS	3,955		3,955				
McGregor NIROP	9,789		9,789				
Waldon NALF	640		640				
Total DOD	466,527		447,446				

* In addition to stipulations required under Alternative A, NM-10, Coal Protection Stipulation, would apply to 11,740 acres.

Note: All leasing would be subject to military commander stipulations.

Pecan Genetics and Improvement Research Laboratory	84		84				
Conservation and Production Research Laboratory	1,531		1,531				
Livestock Insects Laboratory	35		35				
Grassland, Soil and Water Research Laboratory	1,272		1,272				
Total ARS	2,922		2,922				

TABLE 2-2 (Continued)
FEDERAL LANDS OPEN FOR OIL AND GAS LEASING WITH STIPULATIONS
UNDER ALTERNATIVE B

<u>SMA PROJECT/AREA</u>	<u>ACRES</u>	<u>NSO/ND</u>	<u>NSO/DD</u>	<u>NSO/ELEV</u>	<u>ORA-1</u>	<u>ORA-2</u>	<u>ORA-3</u>
Amistad Reservoir	65,000	*		**			
Falcon Reservoir	87,000	*		***			
Total USIBWC	152,000						

- * NSO/ND within 2,300 feet of the centerline of the dam embankment.
- ** NSO below the 1,144.3 foot elevation traverse (USIBWC Stip. No. 1).
- *** NSO below the 307 foot elevation traverse (USIBWC Stip. No. 1).

Pantex	16,000	16,000					
Total DOE	16,000	16,000					

GRAND TOTAL	1,774,545	64,458	1,342,503				30,854
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ALTERNATIVE APPLICATION

All Federal minerals within the planning area have been evaluated using the three alternatives as potential management guidance. The following description of alternative application is presented by specific location and includes a short description of how each alternative would apply to each location. The SMA lands are grouped according to agency jurisdiction, the split-estate lands are grouped by county by ecoregion.

Federal minerals closed to leasing within Texas are listed by SMA in Table 2-3.

Reasons for a SMA to withhold consent to lease vary from agency to agency however, 43 CFR 3100.0-3 specifically identifies National Park Lands and areas within city limits as excluded from leasing. The fact that all acquired Federal lands in Texas were obtained for a purpose other than mineral leasing and that mineral leasing and development may not be compatible with the reason for acquisition, is sufficient to withhold consent. Additionally, it should be pointed out that while these areas are closed to leasing, if Federal mineral estate is being drained by adjacent oil and gas activities, the Federal mineral estate being drained could be leased for inclusion in a unit for royalty purposes.

TABLE 2-3
FEDERAL LANDS CLOSED TO OIL AND GAS LEASING IN ACRES AS OF 1995

<u>PROJECT/AREA</u>	<u>SMA</u>	<u>ACRES</u>
Amistad NRA	NPS	57,292
Alibates Flint NMO	NPS	1,079
Big Bend NP	NPS	775,279
Big Thicket Pres.	NPS	85,873
Chamizal NME	NPS	54
Fort Davis NHS	NPS	460
Guadalupe Mts. NP	NPS	76,807
Lake Meredith NRA	NPS	44,977
LBJ NHP	NPS	548
Padre Island NS	NPS	130,355
San Antonio		
<u>Missions NHP</u>	<u>NPS</u>	<u>258</u>
Total	DOI/NPS	1,172,982

Anahuac NWR	FWS	30,578
Aransas NWR	FWS	114,397
Attwater Prairie		
Chicken NWR	FWS	7,984
Balcones		
Canyonlands NWR	FWS	10,959
Big Boggy NWR	FWS	4,526
Brazoria NWR	FWS	43,388
Buffalo Lake NWR	FWS	7,664
Laguna Grulla NWR	FWS	5
Hagerman NWR	FWS	12,142
Atascosa NWR	FWS	45,187
Little Sandy NWR	FWS	3,802
Lower Rio Grande		
Valley NWR	FWS	63,115
McFaddin NWR	FWS	42,956
Moody NWR	FWS	3,517
Muleshoe NWR	FWS	5,809
San Bernard NWR	FWS	27,414
Santa Ana NWR	FWS	2,087
Texas Point NWR	FWS	8,952
Trinity River NWR	FWS	4,400
Inks Dam NFH	FWS	99
San Marcos NFH	FWS	119
<u>Uvalde NFH</u>	<u>FWS</u>	<u>101</u>
Total	DOI/FWS	439,201

<u>PROJECT/AREA</u>	<u>SMA</u>	<u>ACRES</u>
Brooks AFB	USAF	1,310
Carswell AFB	USAF	2,558
Goodfellow AFB	USAF	1,124
Kelly AFB	USAF	410
Lackland AFB	USAF	2,712
Camp Mabry	US Army	N/A
Fort Sam Houston	US Army	2,997
<u>Dallas NIROP</u>	<u>USN</u>	<u>314</u>
Total	DOD	11,425

Big Spring Lab.	ARS	247
College Station Lab.	ARS	60
Lubbock Lab.	ARS	47
Temple Lab.	ARS	451
<u>Weslaco Lab.</u>	<u>ARS</u>	<u>3,369</u>
Total	USDA/ARS	4,174

Bastrop FCI	BP	174
Big Spring FCI	BP	101
Bryan FCI	BP	37
Carswell FCI	BP	180
Carswell AFB FCI	BP	94
El Paso FCI	BP	635
Seguinville FCI	BP	128
Texarkana FCI	BP	320
<u>Three Rivers FCI</u>	<u>BP</u>	<u>302</u>
Total	DOI/BP	1,971

GRAND TOTAL	1,629,753
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SPECIFIC SITE DESCRIPTIONS

The following descriptions of the various SMA projects are general and brief. A series of corresponding maps of each SMA project follows each SMA's section.

(1) U.S. Army, COE Tulsa District Projects

Oil and gas leasing stipulations for the Tulsa District COE projects are contained within the Districts Special Stipulations 1-A, a copy of which is contained in Appendix 3. These 1-A stipulations provide for the protection of surface resources through the use of surface occupancy restrictions, drilling restrictions or consultation requirements with authorized surface lessees. Generally, 1-A requires NSO or directional drilling within 2,000 feet under restricted areas. Restricted areas include the major structures such as the dam, spillways, embankments, etc. All existing or proposed public use areas, recreation areas, wildlife and waterfowl refuges, historical sites and hiking or horseback trails are designated NSO. The 1-A stipulations are standardized and apply to all Tulsa District projects.

<u>PAT MAYSE LAKE</u>	<u>MAP 2-1</u>
Project area	18,928 acres
Operations	_____ acres
Wildlife Mgmt.(TPWD)	8,925 acres

Description

Pat Mayse Lake is located in the Red River Basin in Lamar County. The damsite is on Sanders Creek approximately 10 miles north of the town of Paris. The dam is an earthfill structure approximately 7,080 feet in length. At flood control elevation 460.5 feet Mean Sea Level (MSL) the lake covers a surface area of over 7,680 acres. The project was constructed for flood control, municipal and industrial water supply as well as for recreation and fish and wildlife habitat management.

SMA Lease Stipulations

NSO/ND on approximately 1,200 acres associated with the dam and spillway and a 2,000 foot buffer. NSO on approximately 10,000 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Pat Mayse Lake would be available for lease. Stipulations as described above would apply.

Alternative B. In addition to stipulations required under Alternative A, ORA-3 Season of Use restrictions would apply from September 1 through March 31, on the 8,925 acres of wildlife management lands.

Alternative C. Federal minerals within this project would not be available for lease.

<u>TEXOMA LAKE</u>	<u>MAP 2-2</u>
Project area	193,500 acres
Operations	2,050 acres
Recreation (high density)	14,590 acres
Recreation (low density)	44,003 acres
Wildlife Mgmt. (ODWC)	25,942 acres
Wildlife Refuge (FWS)	28,049 acres

Description

Denison Dam is located on the Red River in Bryan County, Oklahoma and Grayson County, Texas approximately 5 miles northwest of Denison, Texas and 15 miles southwest of Durant, Oklahoma. Approximately 30 percent of the project area is situated within the State of Texas. Total length of the dam is 17,200 feet and maximum height above stream bed is 165 feet. Platter Dike is a small structure about 3 miles upstream from the left abutment

of the dam. This dike has a total length of 6,000 feet and is similar to the main embankment in design. The Cumberland Dikes consist of two rolled earthfill levees approximately 23,500 feet in length on the Washita River near Cumberland, Oklahoma. At flood control elevation 640 feet MSL there are 143,300 surface areas and a total storage capacity of 5,381,900 acre-feet of water. The lake has two principal arms, the Red and Washita Rivers. The lake has a maximum width of about 3 miles. The Red River arm of the lake has a length of about 60 miles and the Washita arm of the lake is about 45 miles long. There are 580 miles of shoreline at the top of power pool elevation.

The State of Texas has one park, the State of Oklahoma has two parks and the City of Tishomingo, Oklahoma, has two parks. Existing facilities at these areas include some or all of the following: access roads, a state lodge, golf course, paved parking areas, boat launching ramps, marinas, waterborne or masonry vault toilets, potable water, picnic tables, refuse containers, fireplaces, individual campsites and sanitary trailer dump stations. The Hagerman NWR occupies approximately 11,429 acres in Texas and the Tishomingo NWR about 28,049 acres of project lands on

the Oklahoma side. About 710 wells are located in the oil and gas fields on the edges of the project, 530 of the wells are within Texas and 180 of these wells are on the Oklahoma side of the project.

SMA Lease Stipulations

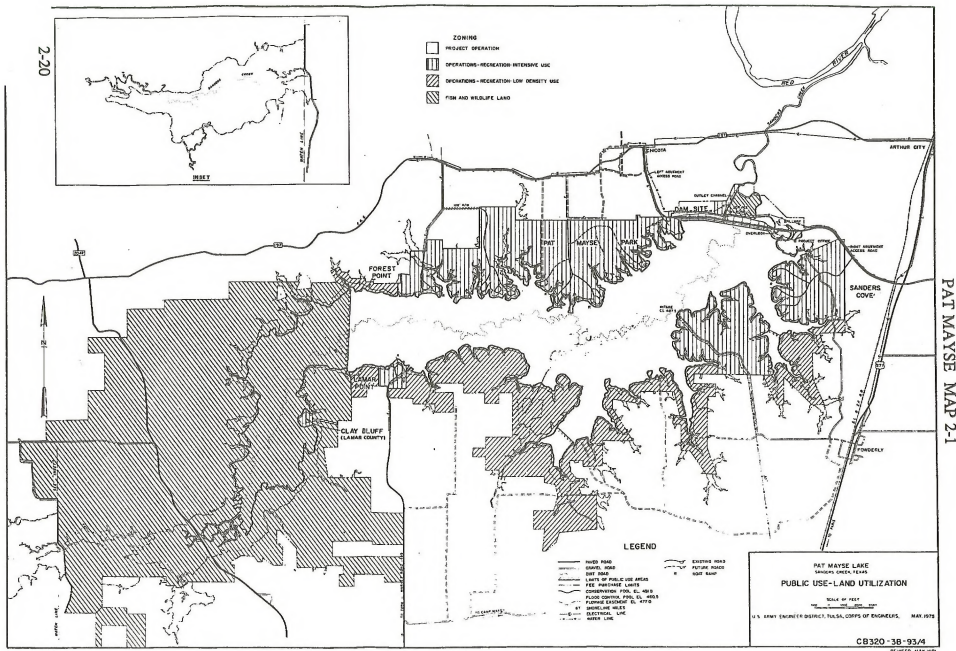
NSO/ND on approximately 4,250 acres associated with the dam and spillway and a 2,000 foot buffer. NSO on approximately 85,500 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

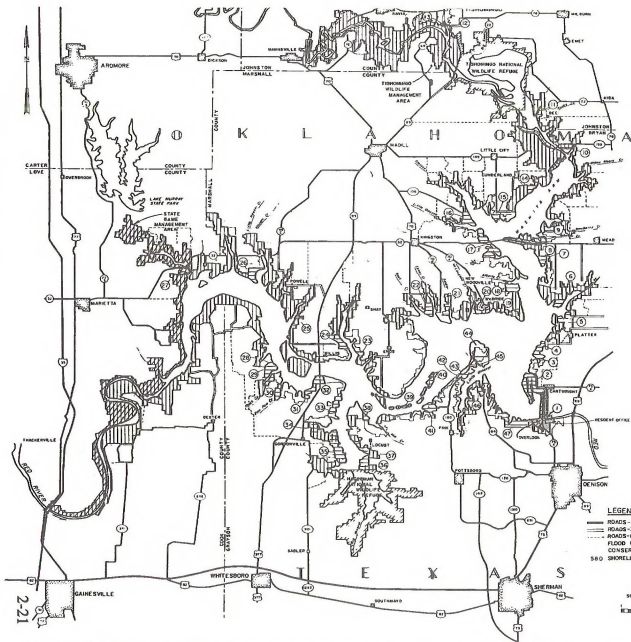
The RMP alternative selected would result in:

Alternative A. COE project lands at Texoma Lake would be available for lease. Stipulations as described above would apply.

Alternative B. In addition to stipulations required under Alternative A, ORA-3 Season of Use restrictions would apply from September 1 through March 31, on the 11,429 acres of wildlife management lands within Texas.

Alternative C. Federal minerals within this project would not be available for lease.





○ PUBLIC USE AREAS

1. BAY BITE AREA
2. BAYVIEW AREA
3. SANDY CREEK
4. WILLIAM WOODS
5. PLATTER FLATS
6. LAKEVIEW
7. WILLOW SPRINGS
8. JOHNSON CREEK
9. HENRIETTA CREEK
10. KANAWA CREEK
11. RUTHER FISH
12. TOWNSHIP CITY PARK
13. PERRYMAN CREEK
14. CANNONLAND COVE
15. BAYVIEW
16. LITTLE BLANKS
17. TOWNSHIP STATE PARK
18. ALBERTA CREEK
19. WILLOW POINT
20. JONES CREEK
21. BOLDEN CREEK
22. CANYON CREEK
23. ARROWHEAD POINT
24. SUNSHINE CREEK
25. BAYVIEW CREEK
26. LEGANOW RESORT
27. HENRIETTA CREEK
28. ROCK CREEK
29. PINE HAWK POINT
30. PINE HAWK CREEK RESORT
31. CEDAR BAYOU
32. JAWPER POINT
33. CEDAR HILLS
34. WALNUT CREEK
35. RED WINDMILL
36. FLOWING WELLS
37. PARADISE COVE
38. WEA CREEK
39. TREASURE ISLAND
40. NORTH ISLAND
41. HAWKPOINT RESORT
42. ISLAND VIEW
43. PRESTON FISHING CAMP
44. PRESTON HILL
45. PRESTON BAY RESORT
46. BRADSHAW POINT
47. BRADSHAW STATE PARK

- PROJECT OPERATIONS
- ▨ OPERATIONS - RECREATION, INTENSIVE USE
- ▤ OPERATIONS - RECREATION, LOW DENSITY USE
- ▧ OPERATIONS - WILDLIFE MANAGEMENT - STATE

LEGEND

- ROADS - PAVED
- ROADS - IMPROVED
- ROADS - COUNTY
- FLOOD CONTROL POOL, EL. 640.0
- CONSERVATION POOL, EL. 650.0
- S.D. SHORELINE, MILES AT EL. 650.0

SCALE OF MILES

0 1 2 3 4 5 6 7 8 9 10



LOCALITY MAP

TEXOMA MAP 2-2

LAKE TEXOMA



DEPARTMENT OF THE ARMY
Tulsa District Corps of Engineers
Tulsa, Oklahoma

(2) U.S. Army COE Fort Worth District Projects

Oil and gas leasing stipulations for the Fort Worth District COE projects are contained within the Districts Special Stipulations. A copy is contained in Appendix 3. These stipulations provide for the protection of surface resources through the use of surface occupancy restrictions, drilling restrictions or consultation requirements with authorized surface lessees. Generally, Fort Worth District requires NSO/ND within 3,000 feet under restricted areas. Restricted areas include the major structures such as the dam, spillways, embankments, etc. A NSO restriction applies to all areas below the lakes flood elevation level and to existing or proposed public use areas, recreation areas, wildlife and waterfowl refuges, unique ecological areas, historical sites and hiking or horseback trails. The special stipulations are standardized and apply to all Fort Worth District projects.

AQUILLA LAKE	MAP 2-3
Project Area	12,395 acres
Operations Area	1,200 acres
Wildlife Mgmt.	9,700 acres
Conservation Pool	3,280 acres

Description

Located on the Aquilla Creek in the lower Brazos River Basin this reservoir covers a normal area of 3,280 surface acres. The main purpose for this lake is flood control. This lake has a flood control storage capacity of 86,700 acre-feet at an elevation of 551 feet MSL. The flood control pool covers an area of approximately 7,000 acres. Approximately, 9,700 acres of land and water are leased to TPWD for wildlife management purposes.

SMA Lease Stipulations

NSO/ND on approximately 1,200 acres associated with the dam and spillway and a

3,000 foot buffer. NSO on approximately 9,180 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Aquilla Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

BARDWELL LAKE	MAP 2-4
Project Area	8,157 acres
Recreation Area	1,238 acres
Operations	274 acres
Conservation Pool	3,570 acres

Description

Bardwell Lake is located at river mile 5 on Waxahachie Creek, about five miles south of Ennis, in Ellis County. Bardwell has a conservation pool of 3,570 acres and a shore line of 25 miles with a flood pool area of approximately 6,040 acres. Total storage capacity is 140,000 acre-feet of which 79,600 acre-feet is in flood control at an elevation of 425 feet MSL. There are seven public use areas on Bardwell Lake that provide facilities such as paved roads, picnic and camping sites, waterborne and vault restrooms, boat launch ramps and improved swimming beaches.

SMA Lease Stipulations

NSO/ND on approximately 700 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 7,447 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Bardwell Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

BELTON LAKE **MAP 2-5**

Project Area (Texas) 30,725 acres
Recreation Area 2,980 acres
Conservation Pool 12,290 acres
Operations Area 500 acres

Description

Located in Central Texas on the Leon River, 16.7 miles upstream from its confluence with Little River and eight miles west of Temple. Belton Lake is one of six COE lakes designed to control floods and conserve water in the Brazos River Basin. The lake provides recreation and wildlife habitat, has over 136 miles of shoreline with a storage capacity of 1,097,600 acre-feet at an elevation of 591 feet MSL and has a surface area of over 12,000 acres.

Existing recreational facilities consist of roads, parking, boat launching ramps, drinking fountains, vault and waterborne toilets, picnic areas, tables and facilities to provide for the health and safety of the general public. Belton Lake holds outstanding surface use leases with the Boy Scouts of America, Girl Scouts of America and the Fort Hood Special Services.

SMA Lease Stipulations

NSO/ND on approximately 500 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 25,775 acres as buffers to recreational

facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Belton Lake would be available for lease. Stipulations as described above would apply.

Alternative B. In addition to stipulations required under Alternative A, ORA-3 Season of Use restrictions would apply from September 1 through March 31, on the approximately 5,000 acres of wildlife management lands.

Alternative C. Federal minerals within this project would not be available for lease.

BENBROOK LAKE **MAP 2-6**

Project Area 11,275 acres
Recreation Area 3,033 acres
Operations 176 acres
Conservation Pool 3,770 acres

Description

Benbrook Lake is located at river mile 15 of the Clear Fork of the Trinity River about 10 miles southwest of the City of Fort Worth. The lake has a total conservation pool of 3,770 acres and a shoreline of 40 miles. The lake provides flood control, water supply and recreation. Total storage capacity is 258,600 acre-feet with 170,350 acre-feet devoted to flood control at an elevation of 694 feet MSL. The flood control pool surface area covers approximately 7,630 acres. Facilities include paved roads, picnic and camping areas, waterborne and vault restrooms, boat launch ramps and improved swimming beaches.

SMA Lease Stipulations

NSO/ND on approximately 950 acres associated with the dam and spillway and a

3,000 foot buffer. NSO on approximately 10,526 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Benbrook Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

<u>B.A. STEINHAGEN LAKE</u>	<u>MAP 2-7</u>
Project Area	22,800 acres
Operations	176 acres
Recreation Area	2,185 acres
Conservation Pool	13,700 acres

Description

The B.A. Steinhagen Project is located on the Neches River in Tyler and Jasper Counties, approximately .5 miles north of the town of Town Bluff. The project serves as a conservation storage site for municipal and industrial water needs for downstream communities. A small hydroelectric generating plant was completed in 1989. The lake has a water storage capacity of 94,200 acre-feet. It has a conservation pool of 13,700 acres, a flood pool of approximately 16,830 acres and controls runoff from 7,573 square miles of Neches River. The length of the shoreline is 160 miles at the top of the conservation pool. The project also has a substantial recreational program that provides facilities such as paved roads, graveled roadways, paved parking area, graveled parking areas, boat launching ramps, water wells, drinking fountains, toilets and sanitary dump station.

SMA Lease Stipulations

NSO/ND on approximately 500 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on 18,554 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at B.A. Steinhagen Lake would be available for lease. Stipulations as described above would apply.

Alternative B. In addition to stipulations required under Alternative A, ORA-3 Season of Use restrictions would apply from September 1 through March 31, on the approximately 13,450 acres of wildlife management lands.

Alternative C. Federal minerals within this project would not be available for lease.

<u>CANYON LAKE</u>	<u>MAP 2-8</u>
Project Area	14,568 acres
Recreation Area	1,534 acres
Operations	900 acres
Conservation Pool	8,240 acres

Description

Canyon Lake is located at mile 303 of the Guadalupe River approximately 14 miles west of San Marcos and 12 miles northwest of New Braunfels. The main purpose of this project is to control flood waters on the Guadalupe River. It has a total storage capacity of 740,900 acre-feet, including 346,400 acre-feet of flood storage at an elevation of 925 feet MSL and 394,500 acre-feet of conservation and sediment reserve. This lake controls runoff from approximately 1,425 square miles. The conservation pool area of Canyon Lake is 8,240 acres and has a

shoreline 80 miles long. The flood pool surface area is approximately 12,890 acres. The lake has seven developed public access areas that include such facilities as access roads, parking lots, boat launching ramps, picnic and camping sites with tables, toilets, trailer dumping sites, marine pump-out station, camping shelters, swimming beaches, public water supplies and litter barrels.

SMA Lease Stipulations

NSO/ND on approximately 900 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 14,516 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Canyon Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

COOPER LAKE MAP 2-9

Project Area	57,328 acres
Recreation Area	6,445 acres
Operations	1,000 acres
Conservation Pool	19,280 acres

Description

Cooper Lake is located on the South Sulphur River. This lake is basically a flood control and water supply lake that controls water on the Sulphur River. It has 67,400 acre-feet of flood control at an elevation of 470.3 feet MSL and at flood elevation the surface area of the lake would be 30,600 acres. Two full-service state parks operated by TPWD are scheduled to open in 1996. Approximately 9,500 acres of

perimeter lands are currently managed by TPWD for wildlife management purposes.

SMA Lease Stipulations

NSO/ND on approximately 1,000 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 37,045 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Cooper Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

GEORGETOWN LAKE MAP 2-10

Project Area	5,830 acres
Recreation Area	1,638 acres
Operations	300 acres
Conservation Pool	1,310 acres

Description

Georgetown Lake is the second lake in the San Gabriel River System designed mainly for recreational use and emergency flood control. The lake is located 3.5 miles west of Georgetown. This lake has a total surface area of 1,310 acres and has approximately 25 miles of shoreline. The lake has a flood storage capacity of 234,200 acre-feet at an elevation of 834 feet MSL. The flood control pool would cover approximately 3,220 acres.

Recreational facilities include park roads, parking areas, boat launching ramps, picnic and camping facilities.

SMA Lease Stipulations

NSO/ND on approximately 300 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 4,315 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Georgetown Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

GRANGER LAKE

MAP 2-11

Project Area	15,303 acres
Recreation Area	1,385 acres
Operations	2,500 acres
Conservation Pool	4,400 acres

Description

Granger Lake is part of a three reservoir system on the San Gabriel river, built for flood control, water supply and recreation. The lake is located about 10 miles northeast of the town of Taylor. The flood pool covers an area of approximately 11,040 acres.

Granger Lake, with a normal surface area of approximately 4,400 acres, lends itself to the development of recreation facilities for boating, waterskiing, fishing, swimming and other activities such as camping, picnicking, hiking, nature study and hunting. Facilities provided consist of park roads, parking areas, picnic, camping and sanitary facilities, potable water and boat launching ramps. Approximately 10,800 acres of land and water are leased to TPWD for wildlife management purposes.

SMA Lease Stipulations

NSO/ND on approximately 2,500 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 12,425 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Granger Lake would be available for lease. Stipulations as described above would apply.

Alternative B. In addition to stipulations required under Alternative A, ORA-3 Season of Use restrictions would apply from September 1 through March 31, on the approximately 10,800 acres of wildlife management lands.

Alternative C. Federal minerals within this project would not be available for lease.

GRAPEVINE LAKE

MAP 2-12

Project Area	17,761 acres
Recreation Area	3,863 acres
Operations	600 acres
Conservation Pool	7,380 acres

Description

Grapevine Lake is located at river mile 11.7 on Denton creek near the City of Grapevine in Tarrant and Denton Counties, about twenty miles northwest of Dallas. Total storage capacity is 435,500 acre-feet with about 238,250 in flood control at an elevation of 535 feet MSL and a flood control surface area of approximately 13,853 acres. Grapevine has a total recreation surface area of 7,380 acres and about 60 miles of shoreline. Facilities include paved roads, picnic and camping sites, waterborne and vault restrooms, boat launch ramps and improved swimming beaches.

SMA Lease Stipulations

NSO/ND on approximately 1,800 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 17,716 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Grapevine Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

HORDS CREEK LAKE MAP 2-13

Project Area	3,027 acres
Recreation Area	1,215 acres
Operations	500 acres
Conservation Pool	510 acres

Description

Hords Creek Lake is located in the central part of the Coleman County. It is 8.75 miles west of the City of Coleman. The lake was constructed for flood control, water supply and recreation. The facilities include roads, parking areas, boat launching ramps, drinking fountains, electrical outlets, vault toilets and picnic and camping facilities.

This project has a surface area of 1,260 acres and a storage capacity at flood level of 25,310 acre-feet at an elevation of 1920 feet MSL. The lake is two miles long and has 11 miles of shoreline.

SMA Lease Stipulations

NSO/ND on approximately 500 acres associated with the dam and spillway and a

3,000 foot buffer. NSO on approximately 2,475 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Hords Creek Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

JOE POOL LAKE MAP 2-14

Project Area	17,121 acres
Recreation Area	5,000 acres
Operations	2,800 acres
Conservation Pool	7,470

Description

Joe Pool Lake is located about 7 river miles above the existing Mountain Creek Dam. The dam site is in Dallas County about 10 miles southwest of the City of Dallas with the reservoir extending into Tarrant, Ellis and Johnson Counties. The main purposes of this reservoir is flood control, water conservation, recreation and fish and wildlife habitat. The lake has a storage capacity of 304,000 acre-feet at an elevation of 536.0 feet MSL with a surface area of 10,940 acres.

The recreation and wildlife area consists of five public park areas. These areas provide for activities such as camping, picnicking, hiking, nature study and water-based activities such as boating, fishing, swimming and water skiing. Because of the lake's location near the Dallas metropolitan area, the lake is able to meet some of the cities demands for outdoor recreation. Facilities include roads, parking

areas, picnicking, camping facilities, sanitary facilities, potable water and boat launching ramps.

SMA Lease Stipulations

NSO/ND on approximately 2,800 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 17,775 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Joe Pool Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

LAKE O' THE PINES MAP 2-15

Project Area	45,095 acres
Recreation Area	754 acres
Operations	1,445 acres
Conservation Pool	19,780 acres

Description

Lake O' The Pines is located largely within Marion County, but extends into the adjacent counties of Harrison, Upshur, Morris, Camp and Titus. It is approximately 65 miles northwest of Shreveport, Louisiana; 130 miles east of Dallas; 45 miles south of Texarkana; and 58 miles east of Tyler. This lake is mainly used for controlling floodwater in the Red River Basin and has a floodwater storage capacity of 587,200 acre-feet at an elevation of 249.5 feet MSL and 251,000 acre-feet of storage for conservation. It is also used for other public benefits such as recreation, conservation of fish and wildlife and the

provision of domestic and industrial water supply.

Recreation facilities include roads, boat ramps, picnic units, toilets, signs and safety features. Approximately 5,000 acres of land and water are leased to TPWD for wildlife management purposes.

SMA Lease Stipulations

NSO/ND on approximately 1,445 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 38,200 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Lake O' The Pines would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

LAVON LAKE MAP 2-16

Project Area	38,364 acres
Recreation Area	2,834 acres
Operations	1,500 acres
Conservation Pool	21,400 acres

Description

Lavon Lake is located in North Central Texas at river mile 55.9 on the East Fork of the Trinity River approximately 25 miles northeast of Dallas in Collin County. The primary purpose of this lake is to provide flood control for East Fork farmlands and provide conservation storage for municipal and industrial purposes. Total storage on Lavon is 748,200 acre-feet at an elevation of 503.5 feet

MSL with 33,500 acres in surface area and 121 miles of shoreline. In addition to the flood control objective the lake also provides for many types of water based activities such as fishing, boating, swimming, picnicking, camping, nature study, photography and hunting. Hunting and fishing are allowed in undeveloped and non-public areas on an interim basis. To complement the activities offered the COE also provides a full host of facilities such as camping areas, picnic tables, toilets, boat launching ramps and parking areas. Some limited agricultural practices are allowed on portions of the project area that are not in public use and can be a benefit of the land. Lavon Lake is unique in that the TPWD opened a fishery as a research project to study more than 10 families and 44 species of fish on the lake.

SMA Lease Stipulations

NSO/ND on approximately 1,500 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 36,500 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Lavon Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

LEWISVILLE LAKE

MAP 2-17

Project Area	51,691 acres
Recreational Area	3,934 acres
Operations	2,500 acres
Conservation Pool	28,980 acres

Description

Lewisville Lake is located on the Elm Fork of the Trinity River, 30 miles upstream from its confluence with the West Fork of the Trinity River. The entire project is within Denton County and is about 22 miles north of Dallas. The main purposes for the Lewisville Lake and Dam are flood control and water supply. The lake has a normal total surface area of 23,280 acres and approximately 183 miles of shoreline with a flood pool area of approximately 39,080 acres. Facilities on the lake include roads, parking, boat launching ramps, vault toilets, picnic units, camping units and swimming beaches.

SMA Lease Stipulations

NSO/ND on approximately 2,500 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 39,080 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Lewisville Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

NAVARRO MILLS LAKE MAP 2-18

Project Area 14,216 acres
Recreation Area 1,195 acres
Operations 730 acres
Conservation Pool 5,070 acres

Description

Navarro Mills Lake is located at river mile 63.9 on Richland Creek, about 16 miles southwest of Corsicana, in Navarro and Hill Counties. The lake has a normal surface area of 5,070 acres and about 38 miles of shoreline with a flood pool of approximately 11,700 acres. Total storage capacity is 212,200 acre-feet with 143,200 acre-feet in flood control at an elevation of 443.0 feet MSL. The rest of the storage capacity is in sediment and conservation storage. The facilities available at the lake are paved roads, picnic and camping sites, vault restrooms, boat launch ramps and improved swimming beaches.

SMA Lease Stipulations

NSO/ND on approximately 730 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 12,925 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Navarro Mills Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

O.C. FISHER LAKE MAP 2-19

Project Area 17,975 acres
Recreation Area 4,710 acres
Operational Area 1,500 acres
Conservation Pool 5,440 acres

Description

O.C. Fisher lake is located in the Colorado Basin about 2.3 miles northwest of the town of San Angelo, in Tom Green County. The dam and lake provides flood control protection to San Angelo as well as water supply for the city. The project provides many different types of recreation including golfing, picnicking, camping, and boating. In addition to the recreational facilities there are facilities to provide for the safety and convenience to the general public. These include: picnic and camping tables, boat launching ramps, drinking fountains, rest rooms and roadways. Some of the lake area has been leased to various organizations. Angelo State University and Texas A&M both have large leases with 4,465 and 1,564 respectively. In April, 1995, approximately 7,063 acres of land and water were leased to TPWD for park recreation and wildlife management purposes. The reservoir provides 396,000 acre-feet of storage capacity for flood control and water conservation needs at an elevation of 1,938 feet MSL. The flood pool surface area covers approximately 12,700 acres.

SMA Lease Stipulations

NSO/ND on approximately 1,500 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 17,155 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at O.C. Fisher Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

<u>PROCTOR LAKE</u>	<u>MAP 2-20</u>
Project Area	15,944 acres
Recreation Area	1,210 acres
Operations	1,835 acres
Conservation Pool	4,610 acres

Description

Proctor Lake is located at river mile 238.9 of the Leon River in Comanche County, about eight miles northeast of the town of Comanche. It is located in a primarily rural area with Stephenville and Brownwood being the largest cities within a 50 mile radius. The main purposes for the establishment of this impoundment are flood control, water supply and recreation. This lake has a total storage capacity of 374,200 acre-feet with 310,100 in flood control at an elevation of 1,197 feet MSL covering an area of approximately 14,010 acres. Recreation facilities include paved roads, picnic and camping areas, restrooms, boat launching ramps and water wells.

SMA Lease Stipulations

NSO/ND on approximately 1,835 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 15,400 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Proctor Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

<u>SAM RAYBURN LAKE</u>	<u>MAP 2-21</u>
Project Area	159,754 acres
Operations	2,650 acres
Recreation Area	3,151 acres

Description

The Sam Rayburn Project is located on the Angelina River approximately 15 miles north of the town of Jasper. The dam is located about 25 river miles above the B.A. Steinhagen Lake. The project lands are surrounded by the Angelina National Forest and a small section of the Sabine National Forest. The primary purposes of this dam and reservoir are to provide flood control, hydroelectric power generation and water conservation. This lake has a total storage capacity of 3,997,600 acre-feet, of which 1,099,400 acre-feet at an elevation of 173 feet MSL is for flood control and provides for a flood pool of 142,700 acres. Approximately 43,000 acre-feet are reserved for water supply, 1,403,200 acre-feet for power storage and 1,452,000 acre-feet for sediment reserve and head for power generation. This lake has a shoreline of 560 miles and controls runoff from 3,449 square miles of the Angelina River. The hydroelectric plant generates 52,000 kilowatts.

Recreational activities at Sam Rayburn include sightseeing, boating, skiing, swimming, hunting and fishing. There are paved roads, parking areas, swimming areas, sanitary toilets and boat launching ramps.

SMA Lease Stipulations

NSO/ND on approximately 2,650 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 146,324 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Sam Rayburn Reservoir would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

<u>RAY ROBERTS LAKE</u>	<u>MAP 2-22</u>
Project Area	48,353 acres
Recreation Area	2,800 acres
Operations	2,005 acres
Conservation Pool	29,350 acres

Description

Ray Roberts Lake is located in parts of Denton, Cooke and Grayson counties in North Central Texas. It is approximately four miles northwest of Aubrey. The primary project purposes are flood control, water supply, recreation and wildlife. The total normal surface area is 29,350 acres and a total shoreline of approximately 207 miles with a flood pool surface area of approximately 36,900 acres. The lake is located in the vicinity of Denton, Dallas and Fort Worth and

is extremely accessible to the large metropolitan communities. Recreational facilities include park roads, parking areas, boat launching areas, picnicking and camping facilities, sanitary facilities and potable water. The project area also offers several activities such as camping, picnicking, hiking and water based activities such as boating, fishing, swimming and water-skiing. The majority of project lands and waters are leased to TPWD for fish and wildlife management and recreation.

SMA Lease Stipulations

NSO/ND on approximately 2,005 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 39,700 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Ray Roberts Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

<u>SOMERVILLE LAKE</u>	<u>MAP 2-23</u>
Project Area	32,729 acres
Recreation Area	3,599 acres
Operations	3,520 acres
Conservation Area	11,460 acres

Description

Somerville Lake is located 20 river miles on the Yequa Creek about two miles south of Somerville. It includes parts of Burleson, Lee and Washington Counties. The largest cities within a 50 mile radius are Bryan, College

Station and Brenham. The lake's total storage capacity is 507,500 acre-feet with 337,700 of flood control and the rest in sediment and conservation storage. Somerville Lake has a normal surface area of 11,460 acres and 85 miles of shoreline with a flood pool covering approximately 24,400 acres. The facilities at Somerville include paved roads, camping and picnicking sites, boat launching ramps and improved swimming beaches. The upper half of project lands and waters are leased to TPWD for fish and wildlife management and recreation.

SMA Lease Stipulations

NSO/ND on approximately 3,570 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 27,800 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Somerville Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

STILLHOUSE HOLLOW

<u>LAKE</u>	<u>MAP 2-24</u>
Project Area	16,181 acres
Recreation Area	2,089 acres
Operations	2,130 acres
Conservation	6,430 acres

Description

Stillhouse Hollow is located on the Lampasas River in Bell County, about five miles southwest of Belton. It is located near the

cities of Temple and Killeen and is within 50 miles of the metropolitan areas of Waco and Austin. The main purposes of this lake are flood control, water supply and recreation. This lake has a normal surface area of 6,430 acres and 58 miles of shoreline with a flood pool area of 11,830 acres. The storage capacity is 630,400 acre-feet with 390,600 in flood control at an elevation of 666 feet MSL and the rest in sediment and conservation storage. Facilities on the lake include paved roads, camping and picnicking, toilets and boat launching facilities.

SMA Lease Stipulations

NSO/ND on approximately 2,130 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 13,755 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Stillhouse Hollow Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

WACO LAKE

MAP 2-25

Project Area	21,327 acres
Recreation Area	3,590 acres
Operations	3,357 acres
Conservation Pool	7,270 acres

Description

Waco Lake is located at river mile 4.6 of the Bosque River and forms the northwest edge of the City of Waco in McLennan County. The lake provides water supply for the City of

Waco, flood control and recreation. The lake has a surface area of 7,270 acres and has 60 miles of shoreline. The total storage capacity is 726,400 acre-feet with 553,300 acre-feet of flood control at an elevation of 500 feet MSL. The flood control pool covers an area of over 19,440 acres. The facilities include paved roads, toilets, concessions, boat launching ramps and camping.

SMA Lease Stipulations

NSO/ND on approximately 3,357 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 21,327 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Waco Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

WHITNEY LAKE

MAP 2-26

Project Lake	53,194 acres
Recreational Area	5,438 acres
Operations	2,413 acres
Conservation Pool	23,560 acres

Description

Whitney Lake is located at river mile 442.4 of the Brazos River about nineteen miles southwest of Hillsboro, in Hill and Bosque Counties. It is within 50 miles of Hillsboro, Waco, Cleburne and Waxahachie and is within easy driving distance of the Dallas-Fort Worth area. The primary purpose of Whitney Lake is flood control. The lake has a normal surface

area of 23,560 acres and a shoreline of 190 miles. The flood pool covers approximately 49,820 acres. The storage capacity of the lake is 1,999,500 acre-feet with 1,624,000 acre-feet devoted to flood control at an elevation of 571 feet MSL and the rest in conservation and sediment reserve. The lake also has a hydroelectric plant and generates power for some of the surrounding communities. The facilities include paved roads, picnic and camping facilities, restrooms, boat ramps, water wells and improved swimming beaches.

SMA Lease Stipulations

NSO/ND on approximately 2,413 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 53,194 acres as buffers to recreational facilities, roads, trails and other developments and within the identified conservation pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Whitney Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

WRIGHT PATMAN LAKE

MAP 2-27

Project Area	157,526 acres
Recreation Area	3,075 acres
Operations	2,523 acres
Conservation Area	20,300 acres

Description

Wright Patman Lake is located southwest of Texarkana and extends throughout portions of Bowie, Cass, Morris, Titus and Red River Counties. The towns of Redwater, Maud, Atlanta and Douglasville are around the lake

perimeter. Major objectives are to reduce downstream flooding, provide a municipal and industrial water source and recreation. The lake controls runoff from approximately 3,500 acres from the Sulphur River. The conservation pool has a surface area of 20,300 acres and a capacity of 145,300 acre-feet at an elevation of 259.5 feet MSL. The flood pool has a surface area of 119,700 acres.

Wright Patman Lake provides for picnicking, camping, swimming, water-skiing, boating, sightseeing, fishing and hunting. Facilities include paved roads, parking lots, boat ramps, potable water supplies, toilets, camping and picnic sites. Approximately 27,000 acres of land and water is leased to TPWD for fish and wildlife management and recreation. The majority of this land (25,500 acres) is located at the White Oak Creek Wildlife Management Area.

SMA Lease Stipulations

NSO/ND on approximately 2,523 acres associated with the dam and spillway and a 3,000 foot buffer. NSO on approximately 157,526 acres as buffers to recreational facilities, roads, trails and other developments and within the identified flood pool.

The RMP alternative selected would result in:

Alternative A. COE project lands at Wright Patman Lake would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

STATE 22

FM 3050

3

FM 1947

Peoria

STATE 22

LEGEND

BOAT RAMP with vault toilet
ACCESS POINT with vault toilet
UNCLEARED AREA
CONSERVATION POOL ELEV.537.5

LAKE IN HILL COUNTY

Downtown

Hillsboro

AQUILLA LAKE MAP 2-3

AQUILA C
AREA

NEW ROAD ACCESS AREA
(NO FACILITIES)

FM 1534

CO 108

HAGKERRY CR

CO 112

FM 310

OLD SCHOOL
Ramp

FM 310

FM 933

To Aquila

FM 3370

Fishing Platform

DAIRY HILL
Ramp

Vaughan

OVERLOOK

PROJECT
OFFICE

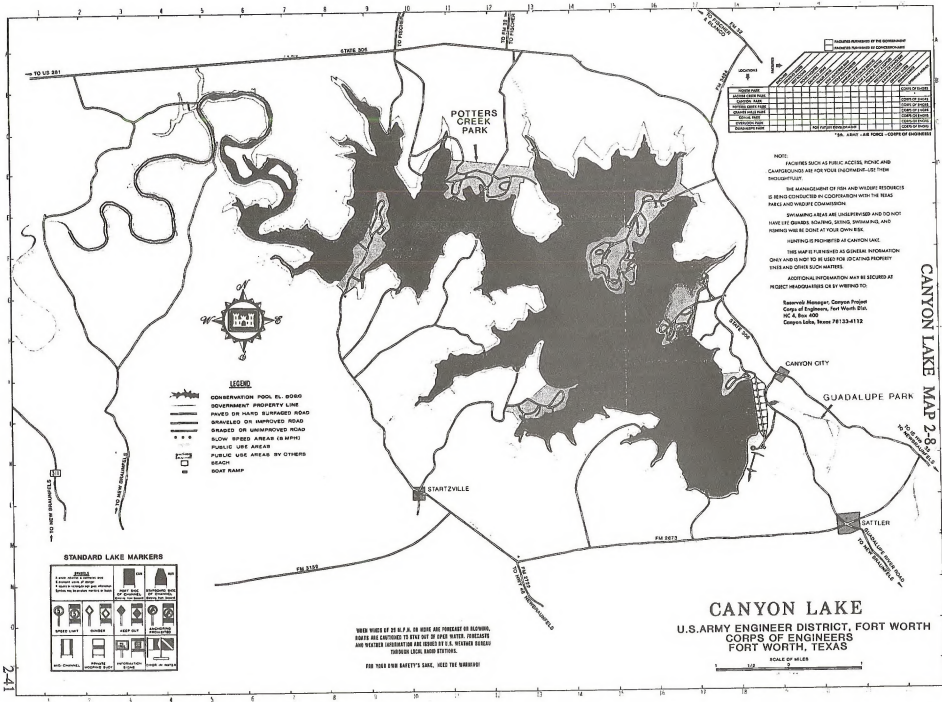
AQUILLA LAKE
BRAZOS RIVER BASIN

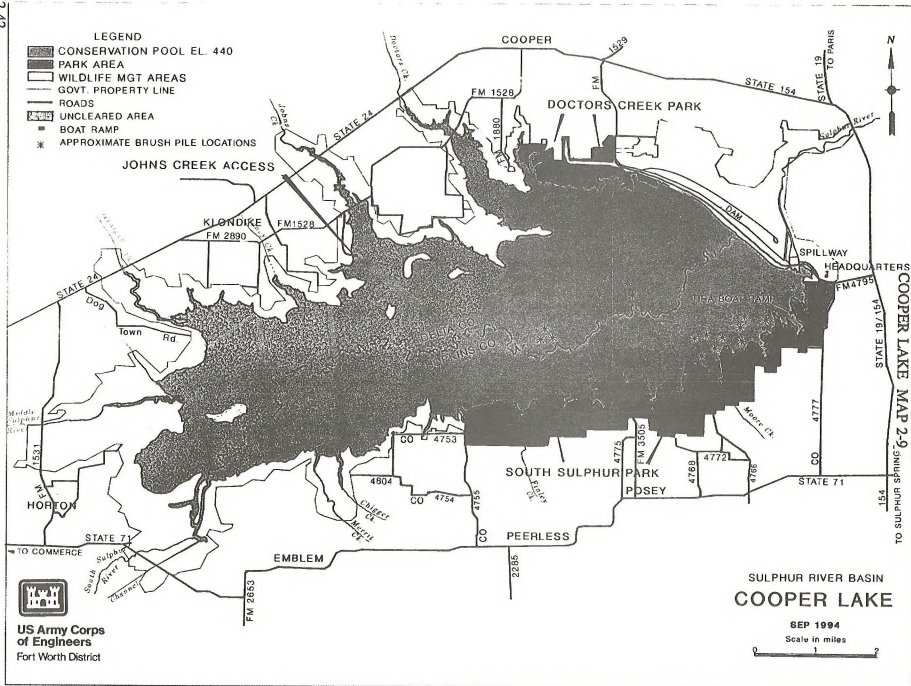
Miles

APR 88

SCALE OF MILES







A FEE MAY BE
CHARGED IN SOME AREAS

THE MANAGEMENT OF FISH AND WILDLIFE RESOURCES IS BEING CONDUCTED IN COOPERATION WITH THE TEXAS PARK AND WILDLIFE COMMISSION.

THE MANAGEMENT OF FISH AND WILDLIFE RESOURCES IS BEING CONDUCTED IN COOPERATION WITH THE TEXAS PARK AND WILDLIFE COMMISSION.

SWIMMING AREAS ARE UNSUPERVISED AND DO NOT HAVE LIFE GUARDS. BOATING, SKIND, SWIMMING, AND FISHING WILL BE CLOSED AT YOUR OWN RISK.

INFORMATION ON AREAS WHERE HUNTING IS PERMITTED
MAY BE SECURED AT PROJECT HEADQUARTERS.

THIS MAP IS FURNISHED AS GENERAL INFORMATION ONLY
AND IS NOT TO BE USED FOR LOCATING PROPERTY LINES AND
OTHER SUCH MATTERS.

ADDITIONAL INFORMATION MAY BE SECURED AT PROJECT HEADQUARTERS OR BY WRITING SO:

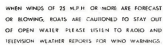
GRANGER PROJECT OFFICE
ROUTE 1, BOX 172
GRANGER, TEXAS 76530
A/C 512/859-2668

Figure 1 consists of two horizontal timelines. The top timeline is labeled 'ANALYSIS' and 'EXPOSURES' at the ends. It has a scale from 0 to 1. The bottom timeline is also labeled 'ANALYSIS' and 'EXPOSURES' at the ends. It has a scale from 0 to 1. Both timelines have a vertical line at 0.5.

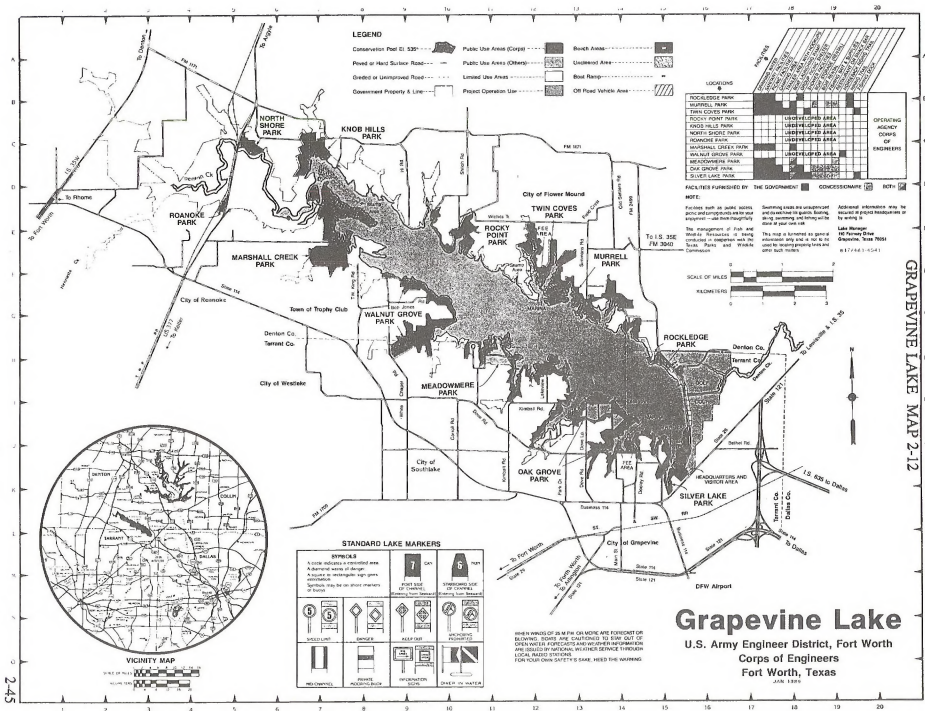
GRANGER LAKE



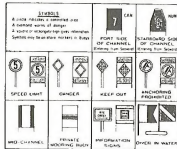
**US Army Corps
of Engineers**
Fort Worth District



FOR YOUR OWN SAFETY'S SAKE,
HEED THE WARNING!



STANDARD RESERVOIR MARKERS



LEGEND

	CONSERVATION POOL ELV. 1900
	GOVERNMENT PROPERTY LINE
	PAVED ROAD
	GRAVELED ROAD
	BOAT RAMP
	SLOW SPEED AREA
	PARK AREA
	LIMITED USE AREA
	RESTRICTED AREA

FACILITIES

[illegible]

NOTE

- FACILITIES SUCH AS PUBLIC ACCESS, PICNIC AND CAMPFIRE ARE FOR YOUR ENJOYMENT — USE THEM THOUGHTFULLY. A USER FEE MAY BE CHARGED IN SOME PARK AREAS.
- THE MANAGEMENT OF FISH AND WILDLIFE RESOURCES IS BEING CONDUCTED IN COOPERATION WITH THE TEXAS PARKS AND WILDLIFE COMMISSION.
- SWIMMING AREAS ARE UNSUPERVISED AND DO NOT HAVE LIFE GUARDS. BATHING, SWIMMING, AND FISHING WILL BE DONE AT YOUR OWN RISK.
- INFORMATION ON AREAS WHERE HUNTING IS PERMITTED MAY BE SECURED AT PROJECT HEADQUARTERS.
- THE MAP IS FURNISHED AS GENERAL INFORMATION ONLY AND IS NOT TO BE USED FOR LOCATING PROPERTY LINES AND OTHER SUCH MATTERS.
- ADDITIONAL INFORMATION MAY BE SECURED AT HEADQUARTERS OR BY WRITING TO:

RESERVOIR MANAGER
HORDS CREEK LAKE
CORPS OF ENGINEERS
HCR 75 BOX 33
COLEMAN, TEXAS 76834
TELEPHONE 815-625-2322

FOR YOUR OWN SAFETY'S SAKE,
HEED THE WARNING!

WHEN WINDS OF 25 M.P.H. OR MORE ARE FORECAST OR BLUING, BOATS ARE CAUTIONED TO STAY OUT OF OPEN WATER. PLEASE LISTEN TO RADIO AND TELEVISION WEATHER REPORTS FOR WIND WARNINGS.

EMERGENCY TELEPHONE NUMBERS

SHERIFF DEPARTMENT	825-2000
FIRE DEPARTMENT	825-2424
POLICE DEPARTMENT	825-4444

HORDS CREEK LAKE

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS










Scale of Miles R. Edwards

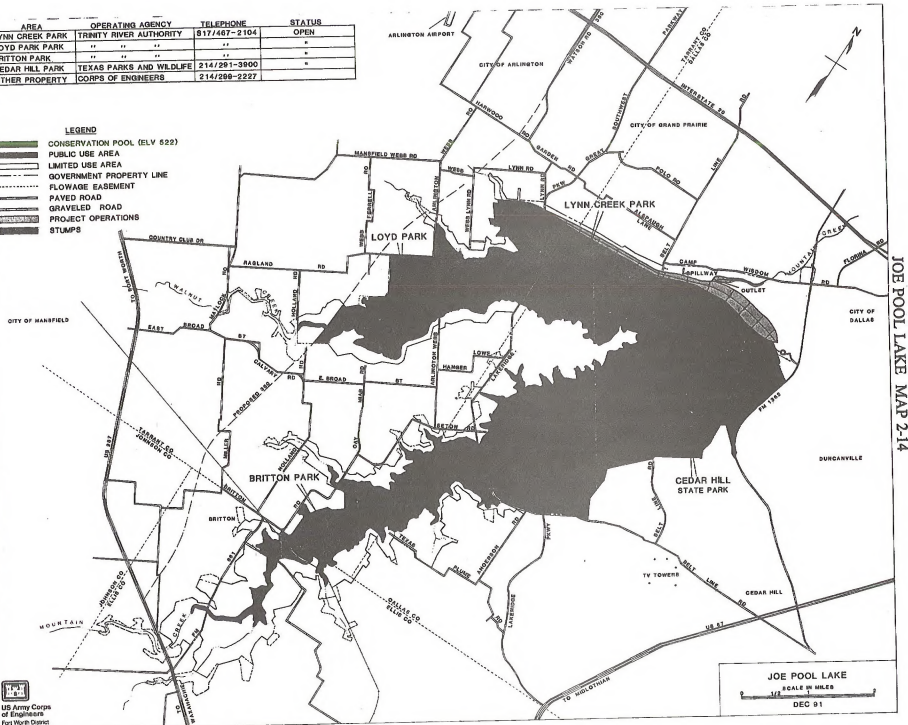
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HORDES CREEK LAKE MAP 2-13

AREA	OPERATING AGENCY	TELEPHONE	STATUS
LYNN CREEK PARK	TRINITY RIVER AUTHORITY	817/467-2104	OPEN
LOYD PARK PARK	" " "	" "	"
BRITTON PARK	" " "	" "	"
CEDAR HILL PARK	TEXAS PARKS AND WILDLIFE	214/291-3900	"
OTHER PROPERTY	CORPS OF ENGINEERS	214/298-2227	"

LEGEND

-  CONSERVATION POOL (ELV 522)
-  PUBLIC USE AREA
-  LIMITED USE AREA
-  GOVERNMENT PROPERTY LINE
-  FLOWAGE EASEMENT
-  PAVED ROAD
-  GRAVELED ROAD
-  PROJECT OPERATIONS
-  STUMPS



JOE POOL LAKE MAP 2-14

JOE POOL LAKE

SCALE IN MILES

DEC 91



US Army Corps
of Engineers
Fort Worth District



Highway Miles to Dam

From Points in Arkansas, Louisiana and Texas

Alexandria, La.	181
Dallas, Tex.	171
Hot Springs, Ark.	189
Jefferson, Tex.	9
Little Rock, Ark.	218
Longview, Tex.	34
Marshall, Tex.	28
At. Pleasant, Tex.	50
Paris, Tex.	100
Shreveport, La.	88
Tomball, Tex.	87
Tyler, Tex.	67

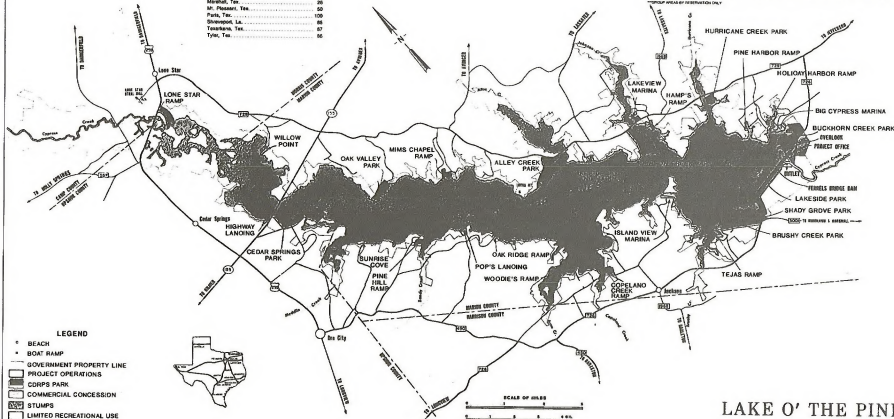
The U.S. Army Corps of Engineers welcomes you to Lake O' The Pines.

The recreation facilities were built for your use and pleasure. Enjoy your activities but be careful and alert. Accidents can happen!

Further information can be obtained by visiting or telephoning the Reservoir Manager. His office is located on the east end of the dam. The address is P.O. Drawer "B", Jefferson, Texas 75657-0002. Telephone 865-2336, Area Code 903.

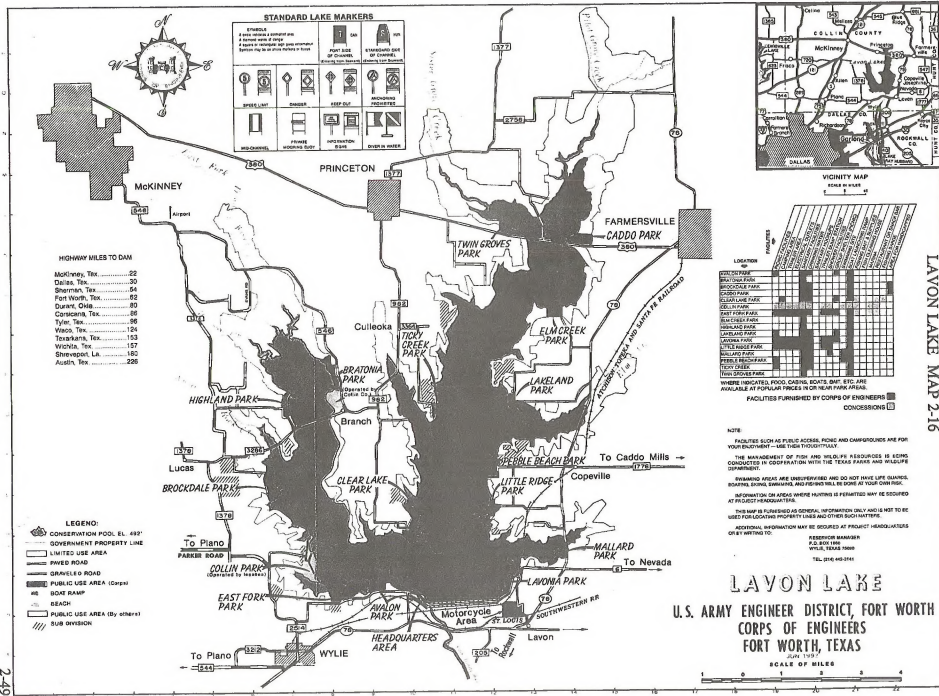
[illegible]

LAKE O' THE PINES MAP 2-15



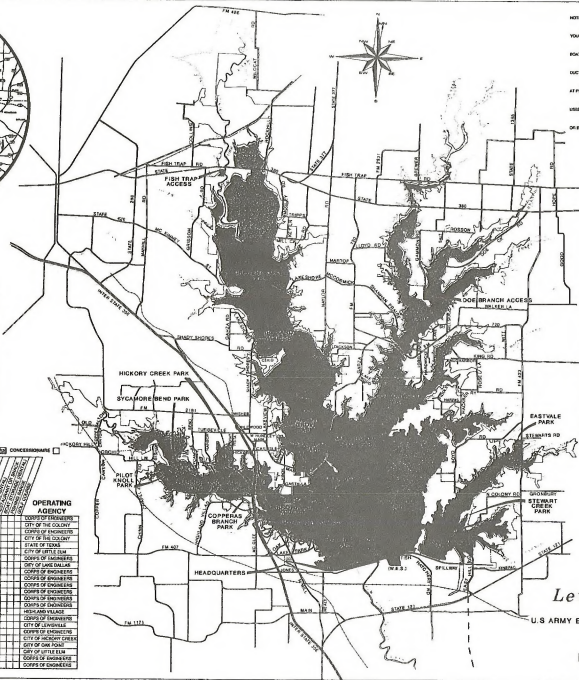
LAKE O' THE PINES

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS



LAVON LAKE MAP 2-16

STANDARD LAKE MARKERS			
SIGNALS A color indicates a potential area. A permanent warning of danger. Is specific to individual water body characteristics. Signals may be on poles or attached to buoys.		 GR POINT BOAT OF CHANNEL <i>(Facing from Toward)</i>	 RR STARTING SIDE OF CHANNEL <i>(Facing Lake Beyond)</i>
 SPEED LIMIT	 DANGER	 STEP DOWN	 ANCHORAGE PROHIBITED
 MAIN CHANNEL	 PRIVATE MOORING BUOY	 NO MOTORING <i>(Boat)</i>	 DOWN IN WATER

[illegible]

RE: FACILITIES SUCH AS PUBLIC ACCESS, FISHING AND CAMPFIRE/GRASS ARE FOR YOUR INFORMATION - USE THEM RESPONSIBLY.

SHOOTING AREAS ARE UNDESIRABLE AND DO NOT HAVE UNDESIRABLE, POISONED, BONES, SHOTGUNS, AND FISHING WILL BE DONE AT YOUR OWN RISK.

THE MANAGEMENT OF YOUR LAND AND WILDLIFE RESOURCES IS BEING CONDUCTED IN COOPERATION WITH THE TEXAS PARKS AND WILDLIFE COMMISSION.


INFORMATION ON AREAS WHERE HUNTING IS PERMITTED MAY BE REQUESTED AT PROJECT HEADQUARTERS.


THEIR IS PURCHASED BY THE STATE, INFORMATION ON AREAS NOT TO BE VISITED FOR LOCATIONS PROJECT AREA AND OTHER SUGGESTIONS.


ADDITIONAL INFORMATION MAY BE REQUESTED AT PROJECT HEADQUARTERS OR BY WRITING TO:


LAND MANAGER
DREW H. WELLS
LIVESTOCK, TEXAS 75687
PHONE 4-855-888


LEGEND


CONSERVATION POOL ELV. 52' 


GOVERNMENT PROPERTY LINE 


PAVED ROAD 


GRAVELED ROAD 


UNIMPROVED ROAD 


PUBLIC USE (CORPS) 


PUBLIC USE (OTHERS) 


LIMITED USE AREA 


BEACH AREA 


PROJECT OPERATIONS AREA 


UNCLEARED AREAS 


RESTRICTED AREA 


BOAT RAMP 

SLOW SPEED AREA 

CHANNEL MARKERS 

FISHING BARGE 

MARINA 

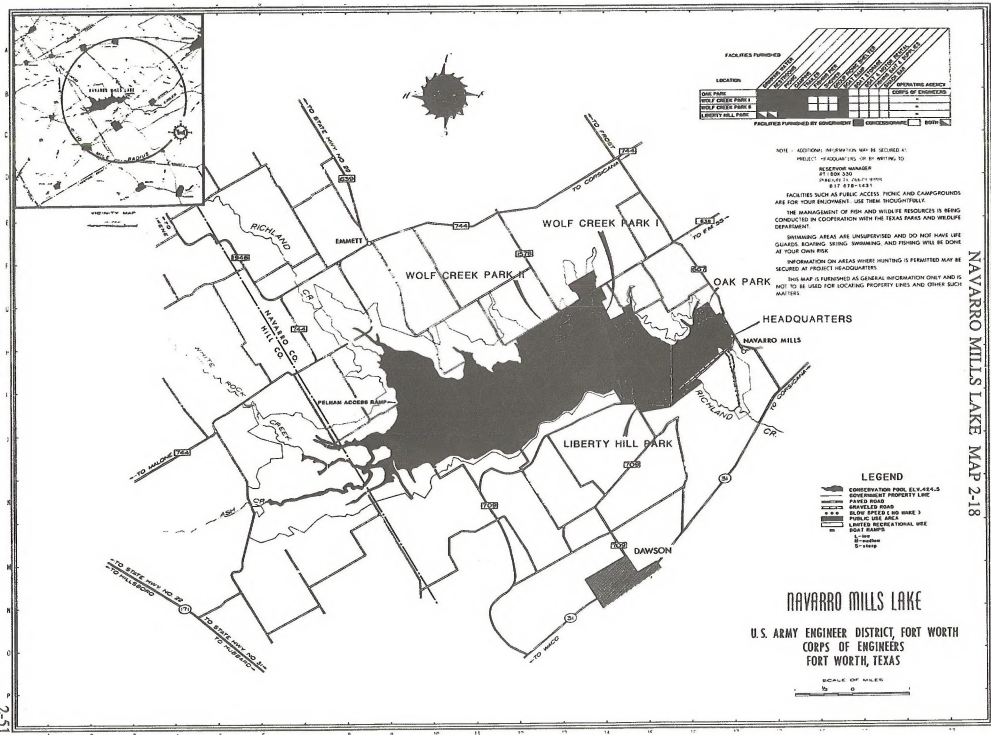
FLOWAGE EASEMENT 

Lewisville Lake

U.S. ARMY ENGINEERS DISTRICT, FORT WORTH
CORPS OF ENGINEERS

SCALE OF MILES

JAN 22





HIGHWAY MILES TO CHICAGO	
READY	78
SWEETWATER	91
ARLEN	96
ROCKFORD	98
MIDLAND	101
COFFEE	132
DEL RIO	157
WACO	207
LUBBOCK	227
AUSTIN	267
SA ANTONIO	278
FOUR WINDS	278
DALLAS	258

•DRIVE •SWIM •HUNT •FISH

Safety

PREVENT GRASS FIRES

Legend



MAXIMUM CONSERVATION FOOD
EL. 1900.0

GOVERNMENT ASIA AND PROPERTY LINE

PAVED OR HARD SURFACED ROAD

GRAVEL/D OR IMPROVED ROAD

SLOW SPEED AREAS 15 MILES PER HOUR

PUBLIC USE AREAS (CODES OF ENFORCEMENT)

PUBLIC USE AREAS (BY OTHERS)

[illegible]

1 = LISTING FACILITY

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NOTE

THE MANAGEMENT OF FISH AND WILDLIFE RESOURCES IS BEING CONDUCTED IN COOPERATION WITH THE TEARS PARKS AND WILDLIFE COMMISSION.

SWIMMING AREAS ARE UNSUPERVISED AND DO NOT HAVE LIFE GUARDS. BOATING, SPIRIT, SWIMMING AND FISHING WILL BE DONE AT YOUR OWN RISK.

INFORMATION ON AREAS WHERE HUNTING AND OFF ROAD VEHICLES ARE PERMITTED MAY BE SECURED AT PROJECT HEADQUARTERS.

THIS MAP IS FURNISHED AS GENERAL INFORMATION ONLY
AND IS NOT TO BE USED FOR LOCATING PROPERTY LINES AND
OTHER SUCH MATTERS.

ADDITIONAL INFORMATION MAY BE SECURED AT PROJECT
HEADQUARTERS OR WRITING TO:
RESERVOIR MANAGER
P.O. BOX 3085
SAN ANGELO, TEXAS 76902
AC 915-945-4762

WINDS OF 25 M.P.H. OR MORE ARE FORECAST ON MONDAY.
BOATS ARE CAUTIONED TO STAY OUT OF OPEN WATER. FORECASTS
AND WEATHER INFORMATION ARE ISSUED BY U.S. WEATHER BUREAU
THROUGH LOCAL RADIO STATIONS.
FOR YOUR OWN SAFETY'S SAKE
HEED THE WARNING!

STANDARD LAKE MARKERS

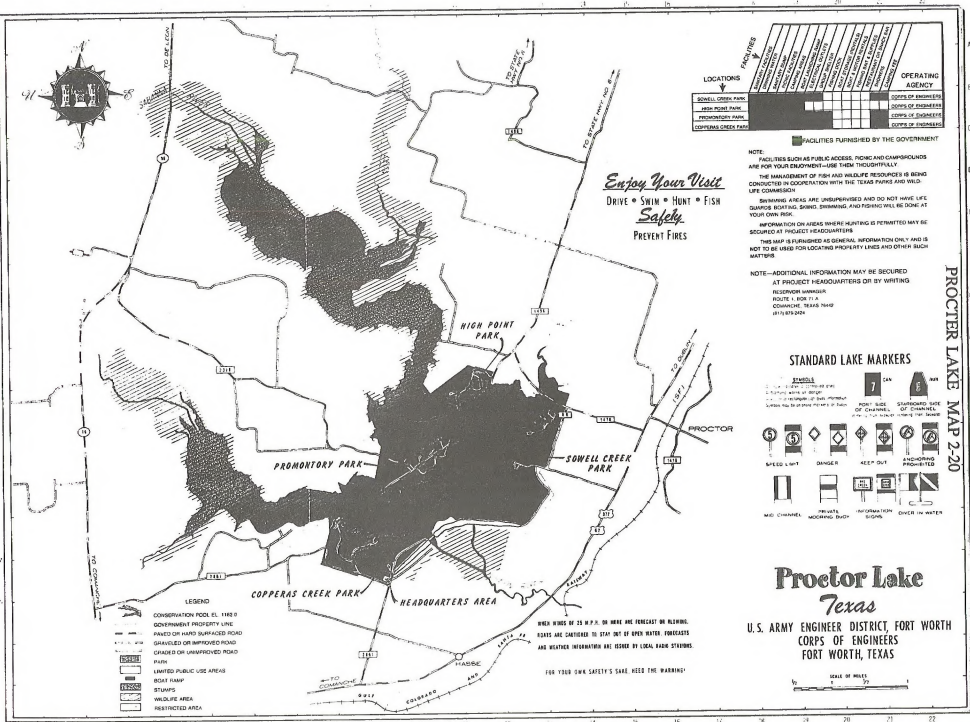
<p>STREETS</p> <ul style="list-style-type: none"> • circle indicates a street and area • diamond shows all danger • yellow to orange light green attention • Symbols may be on more than one sign 	<p>7 CPM</p> <p>RIGHT SIDE OF CHANNEL (Facing Upn. Bound)</p>	<p>6 NCP</p> <p>STANDARD SIDE OF CHANNEL (Facing Down. Bound)</p>
<p>5</p> <p>SPEED LIMIT</p>	<p>DIAMOND</p> <p>KEEP-OUT</p>	<p>ANCHORAGE PROHIBITED</p>
<p>MID-CHANNEL</p>	<p>FRONT'S MOORING RIGHT</p> <p>INFORMATION</p>	<p>DOWN IN WATER</p>

O.C. FISHER LAKE

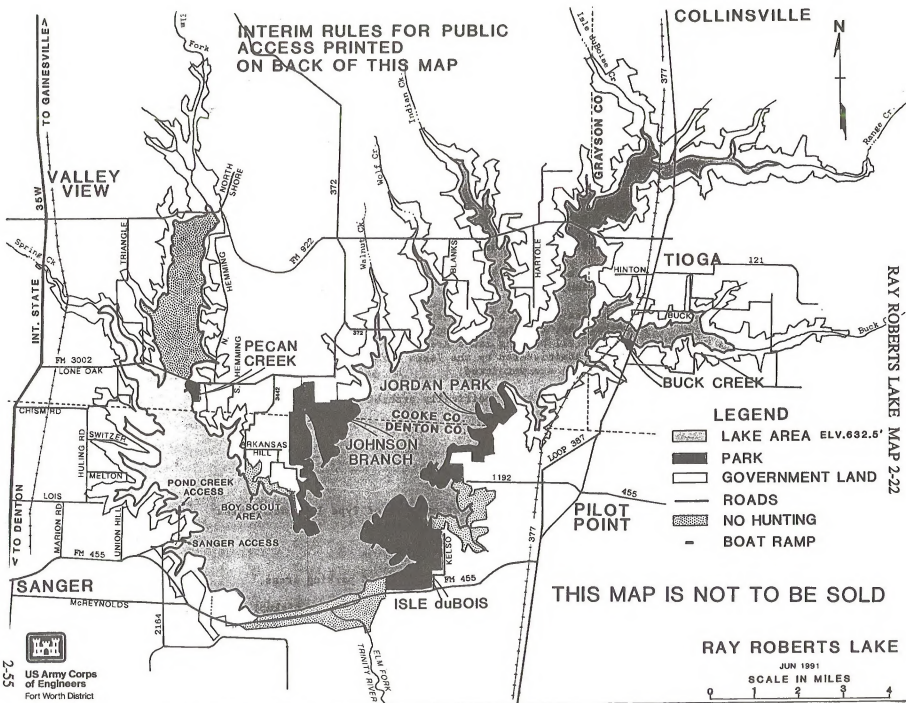
Texas

Scale of Miles

U.S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS



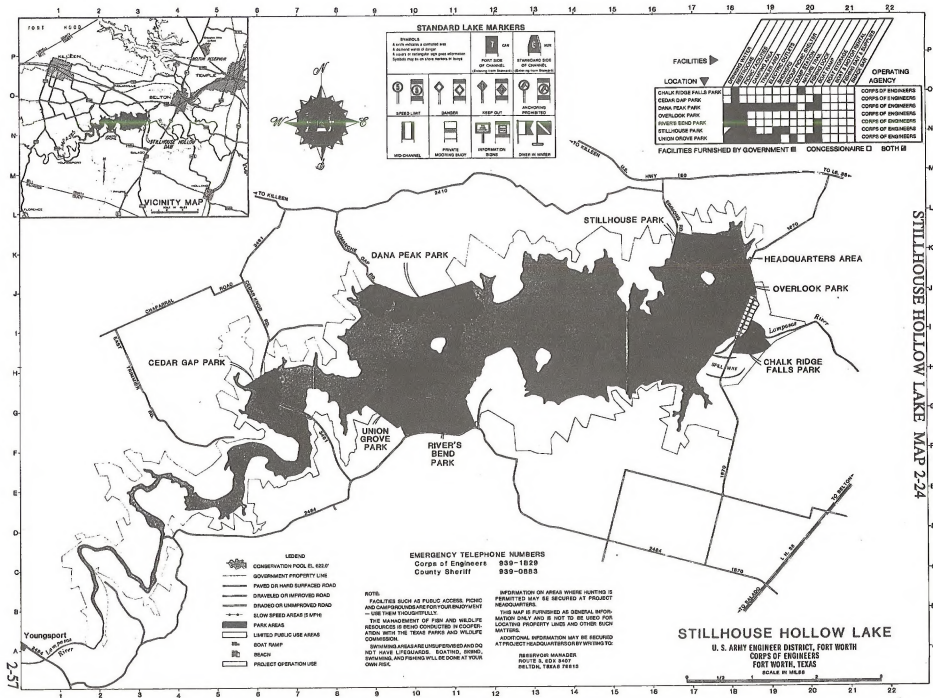
INTERIM RULES FOR PUBLIC
ACCESS PRINTED
ON BACK OF THIS MAP

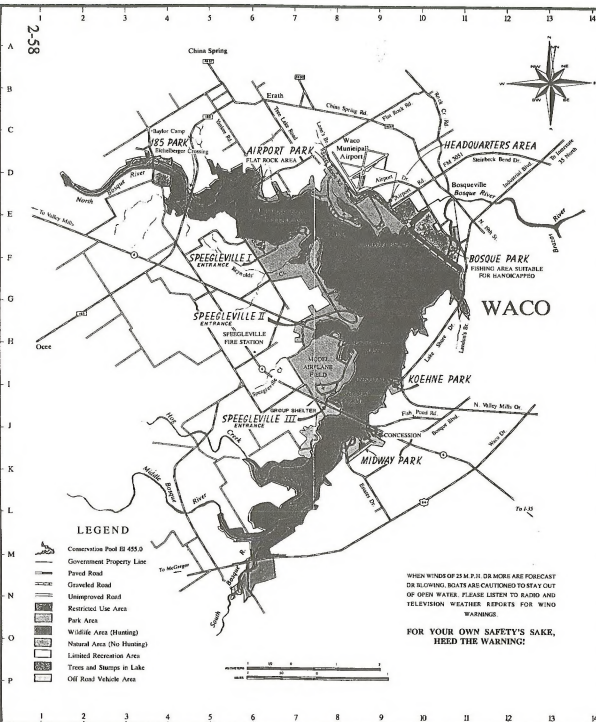


RAY ROBERTS LAKE MAP 2-22









**US Army Corps
of Engineers**
Fort Worth District

Waco Lake

FACILITIES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
REPORT FIRM	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

● Facilities furnished by operating agency
 ■ Facilities furnished by Concessionaire
 ☆ Facilities furnished by operating agency and Concessionaire

NOTE

THIS MAP IS FURNISHED AS GENERAL INFORMATION ONLY AND IS NOT TO BE USED FOR LOCATING PROPERTY LINES AND OTHER SUCH MATTERS.

WACO LAKE IS ENTIRELY WITHIN THE CITY LIMITS OF WACO, TEXAS AND ALL CITY ORDINANCES ARE IN EFFECT.

SWIMMING AREAS ARE UNSUPERVISED AND DO NOT HAVE LIFEGUARDS. BOATING, SWIMMING, AND FISHING WILL BE DONE AT YOUR OWN RISK.

A CAMPING FEE MAY BE CHARGED IN THE CAMPING AREAS OPERATED AND MANAGED BY THE CORPS OF ENGINEERS AND/OR CONCESSIONAIRE.

















AT PARKS WITH GATE ATTENDANTS THE GATES ARE CLOSED FROM 11 P.M. TO 6 A.M.

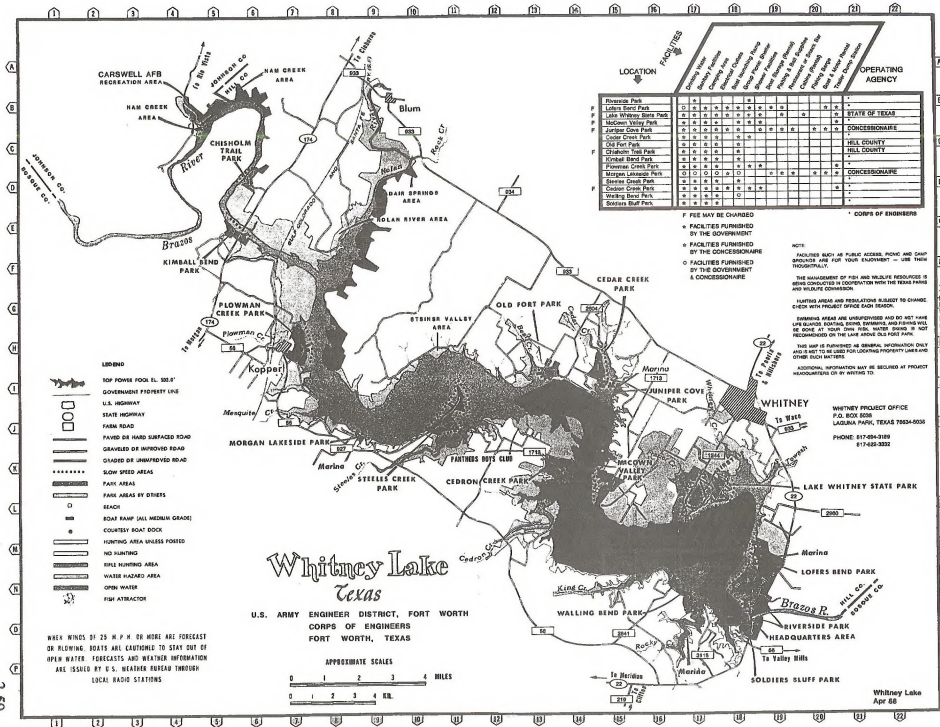
HUNTING IS PERMITTED IN WILDLIFE MANAGEMENT AREAS BY PERMIT. PERMITS ARE AVAILABLE AT THE PROJECT HEADQUARTERS.

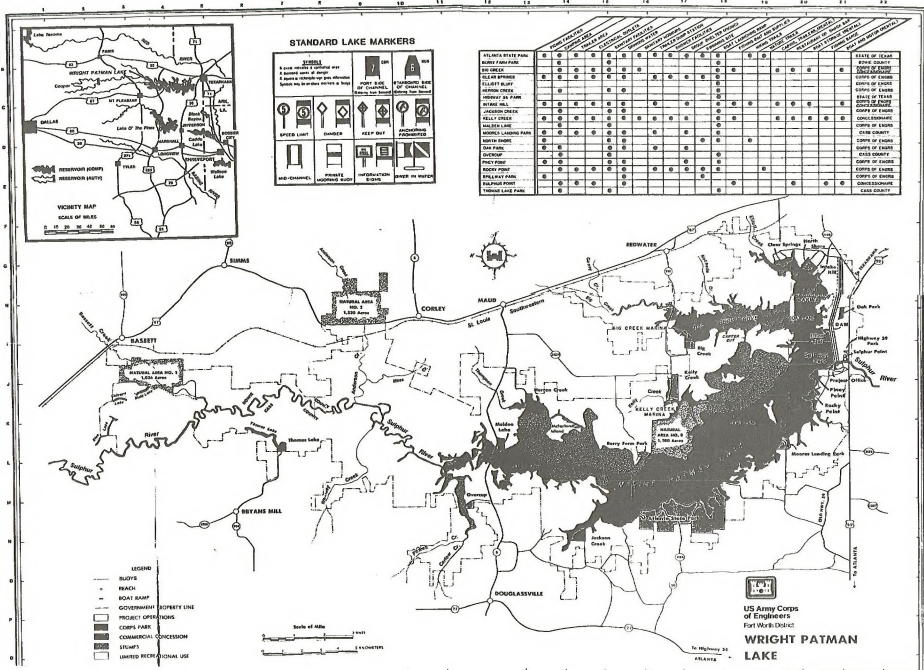
RULES AND REGULATIONS GOVERNING PUBLIC USE OF THE LANDS AND WATERS AT WACO LAKE ARE CONTAINED IN PART 327, CHAPTER III, TITLE 36, CODE OF FEDERAL REGULATIONS.

ADDITIONAL INFORMATION MAY BE SECURED FROM THE PROJECT HEADQUARTERS BY WRITING TO: RESERVOIR MANAGER, WACO LAKE, ROUTE 13, BOX 173-G, WACO, TEXAS 76726 OR CALLING: 817-756-5228.

STANDARD LAKE MARKERS

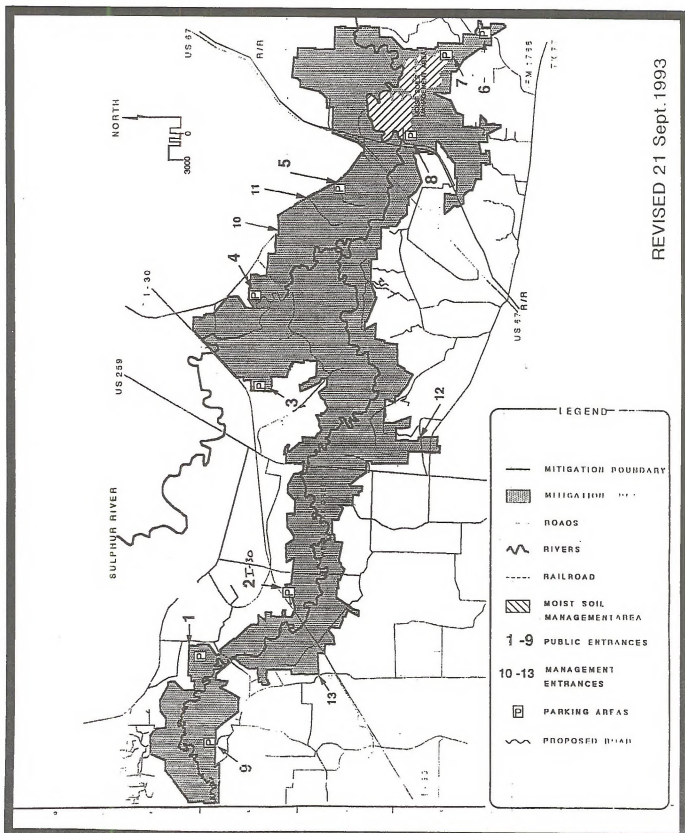
SPEECHES A circle contains a stylized area. A diamond shape of danger. Green or orange light area observation. Symbols may be no more than 10 cm in height.		7 CAR FRONT SIDE OF CHANNEL (SIGNAL LIGHTS)	6 BUS REAR/SIDE SIDE OF CHANNEL (SIGNAL LIGHTS)
 	 	 	 
SPEED LIMIT	DANGER	KEEP OFF	ARCHWAY PROHIBITED
 	 	 	 
MID-CHANNEL	PRIVATE ROAD NO ENTRY	INFORMATION	OVER IN WATER





MAP 2-27a

WHITE OAK CREEK WILDLIFE MANAGEMENT AREA



REVISED 21 Sept. 1993

(3) BR Projects

Oil and gas leasing stipulations for the following reservoir sites are contained in the BR GP-135 Special Stipulations document which is contained in Appendix 3. The GP-135 stipulations provide for protection of BR projects by use of buffer zones which prohibit occupancy and/or drilling for a specific distance.

Maximum project protection is provided by the use of NSO/ND to within 1000 feet under the Maximum Water Surface (MWS) by elevation as defined in Standing Operating Procedures of BR or to within 2,000 feet under dam embankments and appurtenance structures, outlet works, spillways, etc. or to within one-half mile (2,640 feet) of the centerline of any tunnel. Should the maximum project protection stipulation be waived by the BR, additional restrictions protect recreational developments, wildlife habitats, project facilities and water supplies by creating a NSO/DD buffer ranging from 200 to 500 feet around these areas. Stipulations protecting special wildlife habitats or significant surface resources have been identified by project site. The overlapping buffer zones identified for each surface resource results in special stipulations covering acreage greater than the project total.

In all cases, GP-135 requires a site specific surface use plan approved by the BR Area Manager prior to any lease development. Whenever a conflict occurs concerning the applicability of a BR stipulation, the more restrictive stipulation will apply.

CHOKE CANYON DAM AND RESERVOIR - NUECES RIVER PROJECT

MAP 2-28

BR Project 26,000 acres

Description

The Nueces River Project is located in Live Oak and McMullen Counties, midway between the cities of San Antonio and Corpus Christi. Choke Canyon Dam is on the Frio River about 4 miles west of the town of Three Rivers named for the confluence of the Frio, Nueces and Atascosa Rivers. Low-lying hills force the three rivers into a constricted channel, thus the name Choke Canyon. Live oak and post oak trees are generally found near the rivers while mesquite, huisache, blackbrush and grasses cover most of the area. The area has long and hot summers, mild winters and erratic precipitation. Occasional hurricanes produce major storms and flooding. The Nueces River Project was authorized by P.L. 93-493, dated October 27, 1972, to develop a dependable water supply for municipal and industrial use by the City of Corpus Christi and other areas of the Coastal Bend. The multipurpose project also provides for fish and wildlife conservation and recreational opportunities.

Operation and maintenance of the project has been turned over to the City and the Nueces River Authority. Under the terms of a separate agreement, the land and water areas within the reservoir boundary are managed for recreation and fish and wildlife purposes by the TPWD except for a designated area around the dam. The dam and surrounding area are operated and maintained by the City of Corpus Christi.

SMA Lease Stipulations

NSO/ND restrictions will apply within areas of the project where the United States owns 100 percent fee title mineral interest. In project areas where less than the full mineral interest has been acquired, Nueces River Project General Stipulations will apply.

The RMP alternative selected would result in:

Alternative A. BR project lands at the Nueces River Project would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

PALMETTO BEND DAM AND LAKE TEXANA

MAP 2-29

BR Project 11,000 acres

Description

The Palmetto Bend Project is located in the west Gulf Coastal Plain area in Jackson County, approximately 7 miles southeast of Edna. Palmetto Bend Dam is situated in the Navidad River Valley 4 miles upstream from the confluence of the Lavaca and Navidad Rivers. The reservoir, Lake Texana, includes an eighteen mile reach of the Navidad River Valley and the lower portions of the Mustang creek and Sandy Creek Valleys. Water is collected from about 400 square miles of the Navidad River Basin above the damsite. The Palmetto Bend Project was authorized by P.L. 90-562 dated October 12, 1968, for the primary purpose of providing a dependable municipal and industrial water supply of 75,000 acre-feet annually to the Central Gulf Coast area. Lake Texana also provides associated recreational fish and wildlife facilities to several surrounding counties. The

Lavaca-Navidad River Authority is responsible for operation and maintenance of the project. The TPWD manages Texana State Park located within the Lake Texana boundary.

SMA Lease Stipulations

NSO/ND restrictions will apply within areas of the project where the United States owns 100 percent fee title mineral interest. In project areas where less than the full mineral interest has been acquired, Palmetto Bend Project General Stipulations will apply.

The RMP alternative selected would result in:

Alternative A. BR project lands at Lake Texana would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

SANFORD DAM AND LAKE MEREDITH CANADIAN RIVER PROJECT

MAP 2-30

BR Project 700 acres

Description

Sanford Dam and Reservoir is located on the High Plains in parts of Potter, Moore, Hutchinson and Carson Counties and is approximately 40 miles northeast of the city of Amarillo. The aqueduct feature of the project is approximately 320 miles long, traverses several Texas Panhandle counties and serves 11 cities in the High Plains area. The Canadian River Project was authorized by an act dated December 29, 1950, for the purpose of delivering water for municipal and industrial use, controlling floods and providing recreation and fish and wildlife benefits. Under the terms of the repayment contract for project construction costs, operation and maintenance

of Sanford Dam and Lake Meredith was originally turned over to the Canadian River Municipal Water Authority (CRMWA).

By legislation dated November 28, 1990, the lands, waters and interests therein, except for approximately 700 acres around Sanford Dam, were transferred to the NPS for administration as a NRA. The 700 acre area at the dam remain under the jurisdiction of BR and is operated and maintained by the CRMWA.

SMA Lease Stipulations

NSO/ND stipulation will apply within the area of the dam remaining under BR jurisdiction.

The RMP alternative selected would result in:

Alternative A. BR project lands at Lake Meredith would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals within this project would not be available for lease.

TWIN BUTTES DAM AND RESERVOIR SAN ANGELO PROJECT MAP 2-31

Description

The San Angelo Project is located in Tom Green County, approximately 7 miles southwest of the city of San Angelo.

Twin Buttes Dam controls and regulates the flows of the Middle and South Concho Rivers and Spring Creek. The San Angelo Project was authorized by P.L. 85-152, dated August 16, 1957, for the purpose of providing irrigation water to land in Tom Green County and for municipal, industrial and domestic use, controlling floods and providing recreation and fish and wildlife benefits. Under the terms of various contracts, operation and maintenance of Twin Buttes Dam and Reservoir have been turned over to the San Angelo Water Supply Corporation and the city of San Angelo. The project's irrigation facilities are operated and maintained by the Tom Green County Water Control and Improvement District No. 1, located in Veribest.

SMA Lease Stipulations

NSO/ND restrictions will apply within areas of the project where the United States owns 100 percent fee title mineral interest. In project areas where less than the full mineral interest has been acquired, San Angelo Project General Stipulations will apply.

The RMP alternative selected would result in:

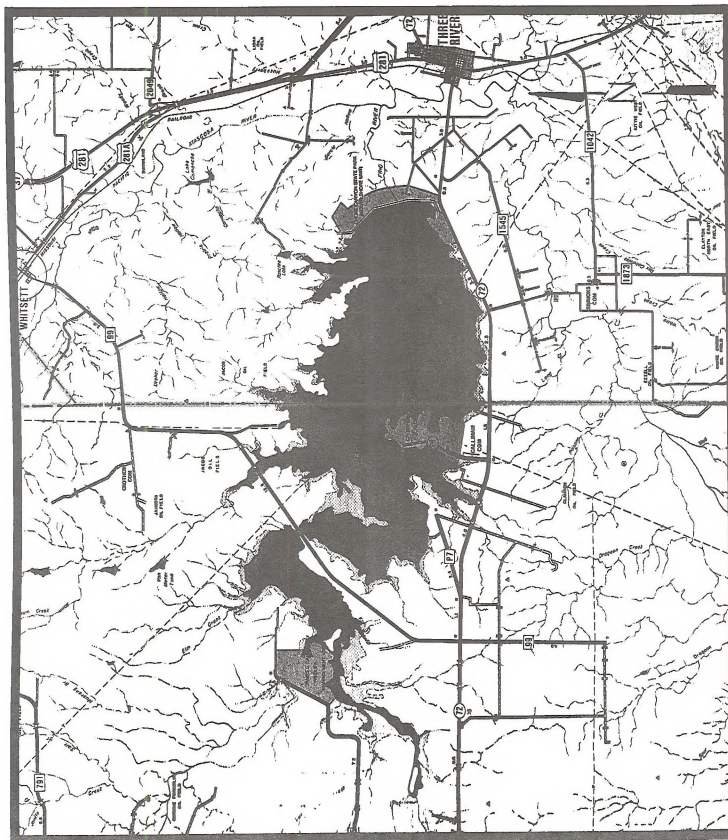
Alternative A. BR project lands at the San Angelo Project would be available for lease. Stipulations as described above would apply.

Alternative B. Same as Alternative A.

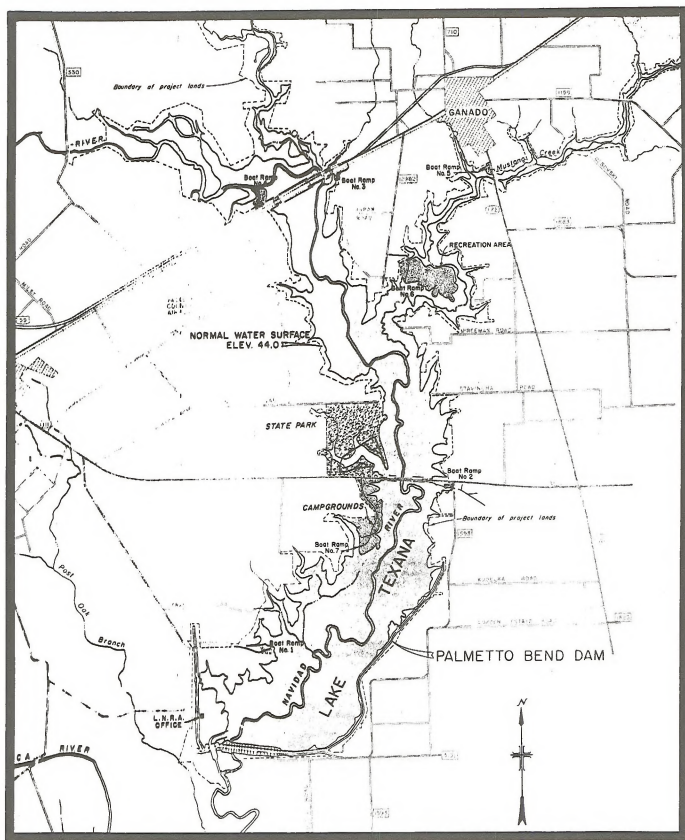
Alternative C. Federal minerals within this project would not be available for lease.

MAP 2-28

CHOKE CANYON RESERVOIR

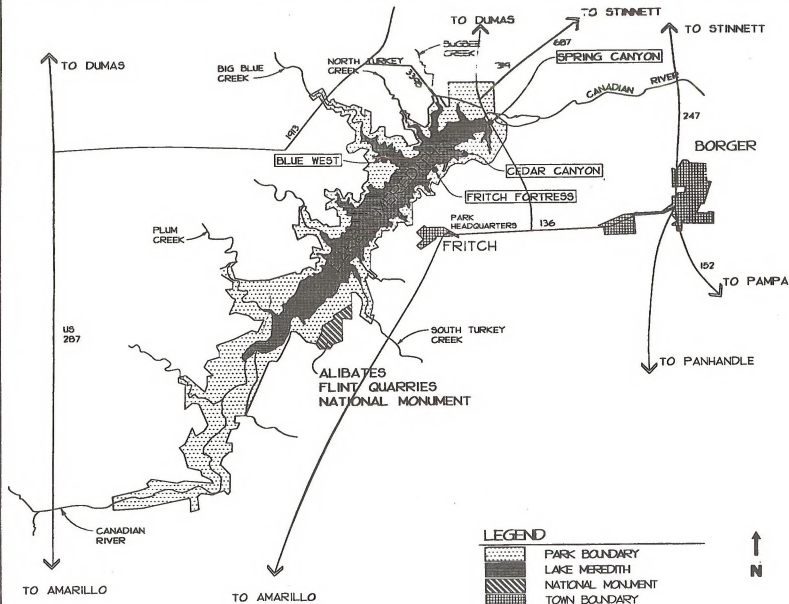


MAP 2-29 LAKE TEXANA

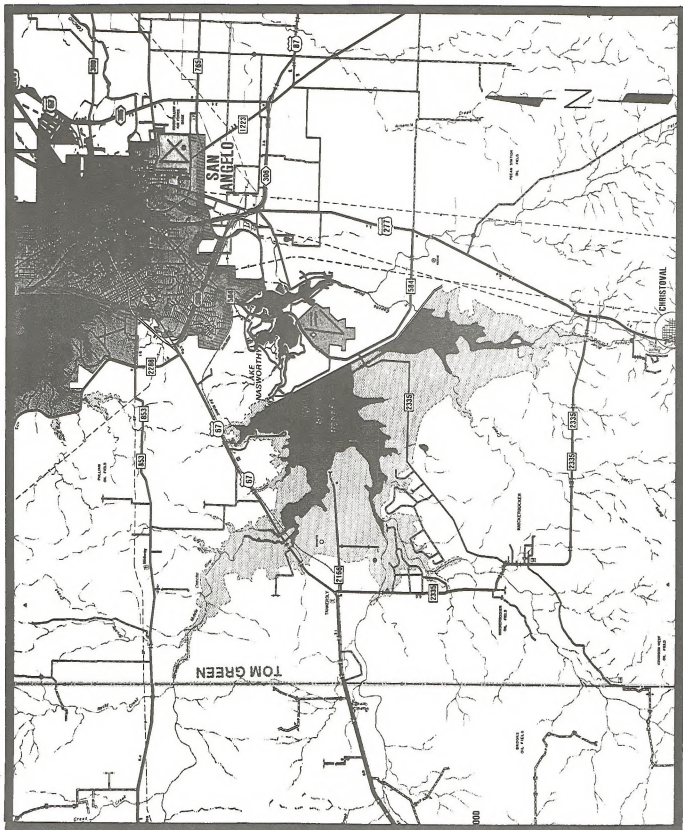


MAP 2-30

LAKE MEREDITH



TWIN BUTTES RESERVIOR



U.S. DEPARTMENT OF DEFENSE MILITARY LANDS

Department of Defense (DOD) lands acquired for military purposes are available for oil and gas leasing subject to DOD leasing stipulations, the approval of the base commander as well as the inclusion of base specific lease stipulations. There are numerous active military facilities located within Texas, those facilities currently available for leasing under the Acquired Minerals Leasing Act are listed below by branch of service.

Generally, DOD military lands are leased with the NSO/DD stipulation, however, the NSO/ND stipulation has been used to keep drilling rigs from impacting mission required air space.

(4) U.S. Army: Forts Bliss, Hood and Wolters, Camps Bowie, Bullis and Swift, Lone Star and Longhorn Army Ammunition Plants and Red River Army Depot.

FORT BLISS **MAP 2-32**
Total Area in Texas 125,295 acres

Description

Fort Bliss located in El Paso county was established in 1848 to protect trails and settlers. Fort Bliss became a cavalry post in the early 1900's and remained so until 1942 when it became a center for anti-aircraft artillery training. The current mission, since 1957, is that of the U.S. Army Air Defense Artillery Center, where U.S. and Allied personnel are trained in the use of all types of air defense weapons, including missiles and other anti-aircraft weapons.

SMA Lease Stipulations

NSO on approximately 125,295 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Fort Bliss be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Fort Bliss would not be available for lease.

FORT HOOD **MAP 2-33**
Total Area 208,712 acres

Description

Fort Hood is located in central Texas in Bell and Coryell Counties approximately 58 miles north of Austin. The facility supports the activities of the III Corp as well as training for Army Reserve and Army National Guard Units. Land uses at Fort Hood are divided into mission training areas, cantonments, airfields and Belton Lake Recreation Area.

SMA Lease Stipulations

NSO on approximately 208,712 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Fort Hood be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Fort Hood would not be available for lease.

FORT WOLTERS**MAP 2-34**

Total Area 3,985 acres

Description

Fort Wolters, located in Parker and Palo Pinto counties, was originally activated in March, 1941, as an Infantry Replacement Training Center. Army recruits received basic training at Camp Wolters before being sent overseas as replacements. Camp Wolters was inactivated in 1945. After World War II, Camp Wolters was purchased from the then War Department by a group of local business men and became known as Camp Wolters Enterprises. Wolters AFB was activated in 1951 with the first contingent of aviation engineer trainees. From 1951 through 1956, the air base personnel were trained to insure the maintenance of the highest possible level of operational readiness. In 1956, Wolters AFB was redesignated Fort Wolters and returned to the control of the U.S. Army with the primary mission of conducting training for the U.S. Army Primary Helicopter School.

SMA Lease Stipulations

NSO on approximately 3,985 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Fort Wolters be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Fort Wolters would not be available for lease.

CAMP BOWIE**MAP 2-35**

Total Area 3,858 acres

Description

Camp Bowie is located in Brown County and

was established as an infantry replacement training camp in 1941. In 1947, Camp Bowie was declared to the War Assets Administration for disposal as surplus property. In 1948, the Department of the Army withdrew from surplus the 104.3 acres made available for use by the Texas National Guard and 10.3 acres being used for Organized Reserve Corps in 1948.

SMA Lease Stipulations

NSO on approximately 3,858 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Camp Bowie be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Camp Bowie would not be available for lease.

CAMP BULLIS**MAP 2-36**

Total Area 27,880 acres

Description

Camp Bullis, located in Bexar and Comal counties, was established in 1906 as a target range for Fort Sam Houston. The facility is currently used for field training exercises by active Army units from Fort Sam Houston and also by Army Reserve components.

SMA Lease Stipulations

NSO on approximately 27,880 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Camp Bullis be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Camp Bullis would not be available for lease.

CAMP SWIFT **MAP 2-37**

Total Area 11,740 acres

Description

Camp Swift, located in Bastrop county north of the town of Bastrop, was created in 1941 as an infantry training base. Currently the facility is used for training by the Texas Army National Guard. A complete description of Camp Swift is contained in the Draft and Final "Camp Swift Lignite Leasing EIS" of 1980 prepared by the BLM.

SMA Lease Stipulations

NSO on approximately 11,740 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Camp Swift be available for lease, stipulations as described above would apply.

Alternative B. In addition to stipulations required under Alternative A, NM-10, Coal Protection Stipulation, would apply to 11,740 acres.

Alternative C. Federal minerals at Camp Swift would not be available for lease.

LONE STAR ARMY AMMUNITION PLANT **MAP 2-38**

Total Acres 15,546

Description

Lone Star Army Ammunition Plant, located in Bowie County approximately 10 miles west of Texarkana, is part of the U.S. Army

Armament, Munitions and Chemical Command. It was built in 1941. It's current mission is to load, assemble and pack conventional ammunition. The plant is government owned and contractor operated.

SMA Lease Stipulations

NSO on approximately 15,546 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Lone Star be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Lone Star would not be available for lease.

LONGHORN ARMY AMMUNITION PLANT **MAP 2-39**

Total Area 8,492 acres

Description

Longhorn Army Ammunition Plant is located in Harrison County south of Caddo Lake approximately 2 miles east of the town of Karnack. The plant is part of the U.S. Army Armament, Munitions and Chemical Command. The plant is government owned and contractor operated.

SMA Lease Stipulations

NSO on approximately 8,492 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Longhorn be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Longhorn would not be available for lease.

RED RIVER ARMY DEPOT MAP 2-38

Total Area 19,081 acres

Description

Red River Army Depot is located approximately 18 miles west of Texarkana and is adjacent to Lone star Army Ammunition Plant. Improved and semi-improved lands comprise 3,376 acres with a majority of the remaining balance being unimproved lands utilized to satisfy safety buffer zone requirements.

SMA Lease Stipulations

All leasing subject to base commander stipulations.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Red River be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Red River would not be available for lease.

(5) **U.S. AIR FORCE:** Bergstrom, Dyess, Laughlin, Randolph, Reese and Sheppard AFBs as well as Laughlin No. 1 and Seguin AAFs.

BERGSTROM AFB MAP 2-40

Total Area 3,215 acres

Description

Bergstrom AFB is located within Travis County, southeast of, and adjoining the city of Austin.

SMA Lease Stipulations

NSO on approximately 3,215 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Bergstrom AFB be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Bergstrom AFB would not be available for lease.

DYESS AFB MAP 2-41

Total Area 5,366 acres

Description

Dyess AFB is located within Taylor County and adjoins the Cities of Abilene and Tye.

SMA Lease Stipulations

NSO on approximately 5,366 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Dyess AFB be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Dyess AFB would not be available for lease.

LAUGHLIN AFB MAP 2-42

Total Area 3,911 acres

Description

Laughlin AFB is located in Val Verde County in close proximity to the city of Del Rio.

SMA Lease Stipulations

NSO on approximately 3,911 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Laughlin AFB be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Laughlin AFB would not be available for lease.

LAUGHLIN NO. 1 AAF MAP 2-43

Total Area 1,200 acres

Description

Laughlin No. 1 AAF is located in Maverick County in close proximity to the towns of Quemado, Normandy and Eagle Pass.

SMA Lease Stipulations

NSO on approximately 1,200 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Laughlin No. 1 AAF be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Laughlin No. 1 AAF would not be available for lease.

RANDOLPH AFB MAP 2-44

Total Area 2,893 acres

Description

Randolph AFB is located within Bexar County adjacent to the City of San Antonio.

SMA Lease Stipulations

NSO on approximately 2,893 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Randolph AFB be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Randolph AFB would not be available for lease.

REESE AFB MAP 2-45

Total Area 2,455 acres

Description

Reese AFB is located within Lubbock County and adjoins the City of Lubbock.

SMA Lease Stipulations

NSO on approximately 2,455 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Reese AFB be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Reese AFB would not be available for lease.

SEGUIN AAF MAP 2-46

Total Area 961 acres

Description

Seguin AAF (associated with Randolph AFB) is located in Guadalupe County and adjoins the City of Seguin.

SMA Lease Stipulations

NSO on approximately 961 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Seguin AAF be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Seguin AAF would not be available for lease.

SHEPPARD AFB

MAP 2-47

Total Area 4,160 acres

Sheppard AFB is located in Wichita County and adjoins the City of Wichita Falls.

SMA Lease Stipulations

NSO on approximately 4,160 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Sheppard AFB be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Sheppard AFB would not be available for lease.

(6) U.S. Navy: Corpus Christi and Kingsville NAS, Cabaniss and Waldron NALF and the McGregor Naval Industrial Reserve Ordnance Plant (NIROP).

CORPUS CHRISTI NAS
WALDON AND CABANISS

MAP 2-48

NALF

(NO MAP)

Total Area Corpus Christi NAS . 2,593 acres
Cabaniss NALF 800 acres
Waldon NALF 640 acres

Description

Corpus Christi NAS, Cabaniss and Waldon NALF are located in Nueces County on the southern and western edges of the City of Corpus Christi. These facilities are all located within the corporate limits of the City of Corpus Christi.

The NAS is a roughly rectangular base on the west of Corpus Christi Bay which borders the Gulf of Mexico. The Base is surrounded on three sides by water, on the west by Oso Bay, the north by Corpus Christi Bay and the east by Laguna Madre.

Note: The Federal minerals within the corporate city limits of the City of Corpus Christi are subject to leasing by special act of the U.S. Congress.

SMA Lease Stipulations

NSO on approximately 4,033 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at these facilities be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at these facilities would not be available for lease.

KINGSVILLE NAS MAP 2-48

Total Area 3,955 acres

Description

Kingsville NAS is located on the east side of the town of Kingsville in Kleburg County.

SMA Lease Stipulations

NSO on approximately 3,955 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at Kingsville NAS be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at Kingsville NAS would not be available for lease.

McGREGER NIROP MAP 2-49

Total Area 9,789 acres

Description

The NIROP is located near the town of McGregor in portions of McLennan and Coryell Counties.

SMA Lease Stipulations

NSO on approximately 9,789 acres.

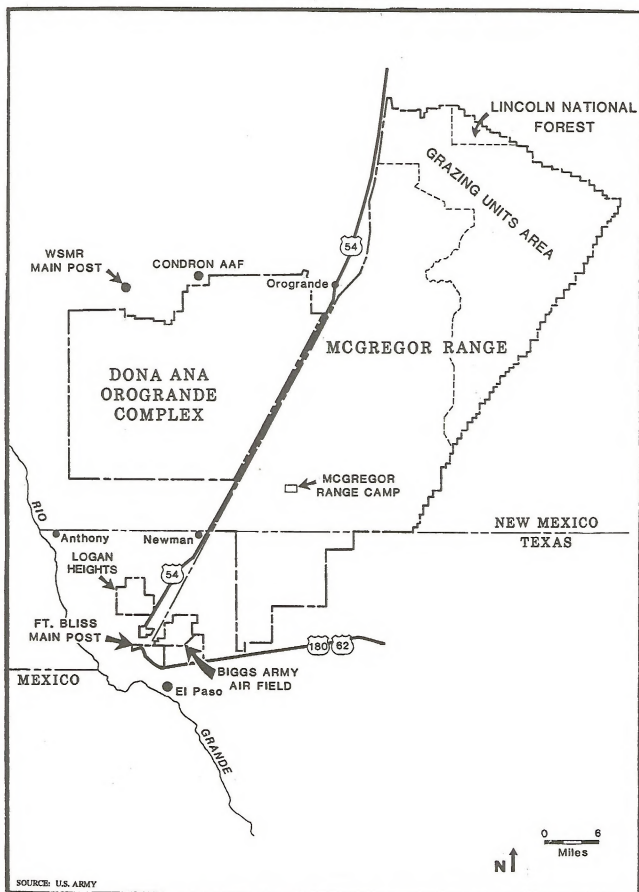
The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

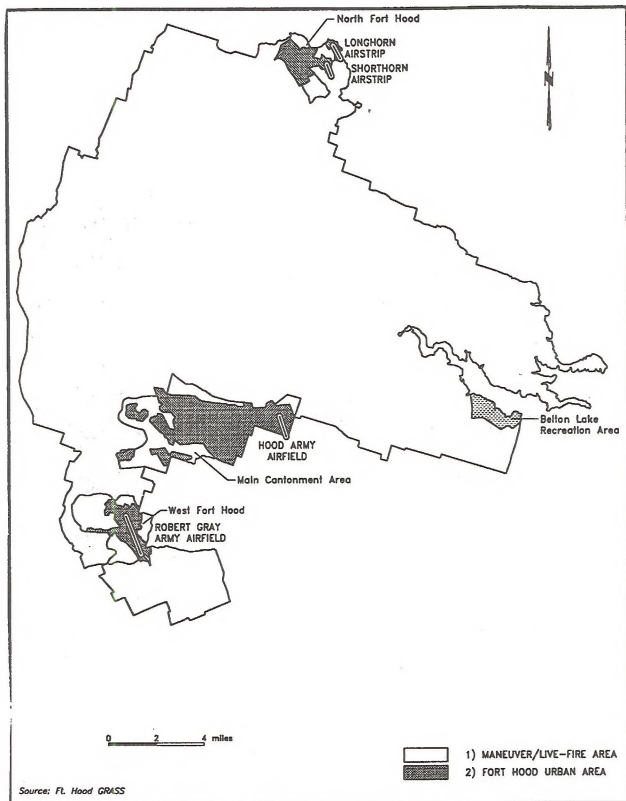
Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

FORT BLISS MAP 2-32

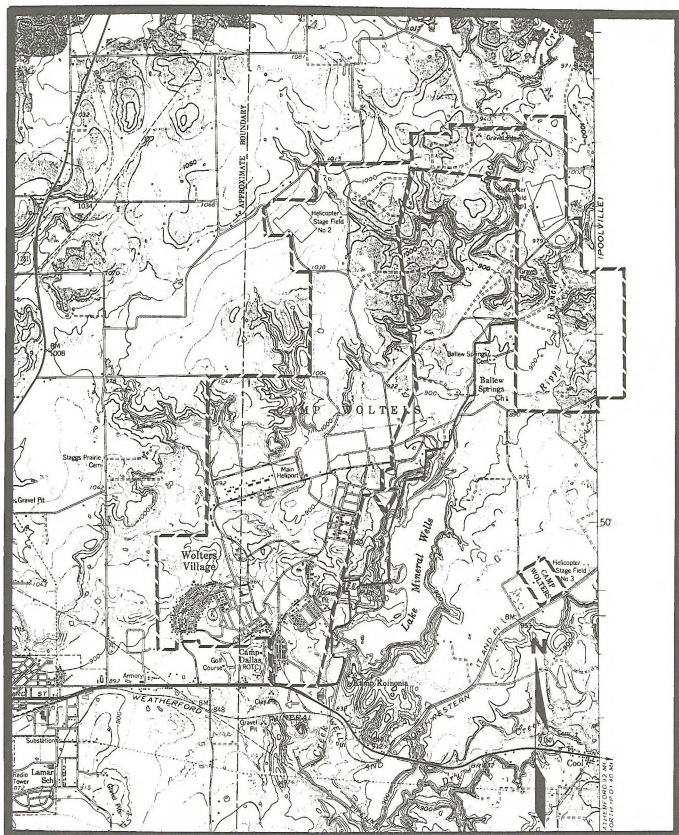


FORT HOOD MAP 2-33



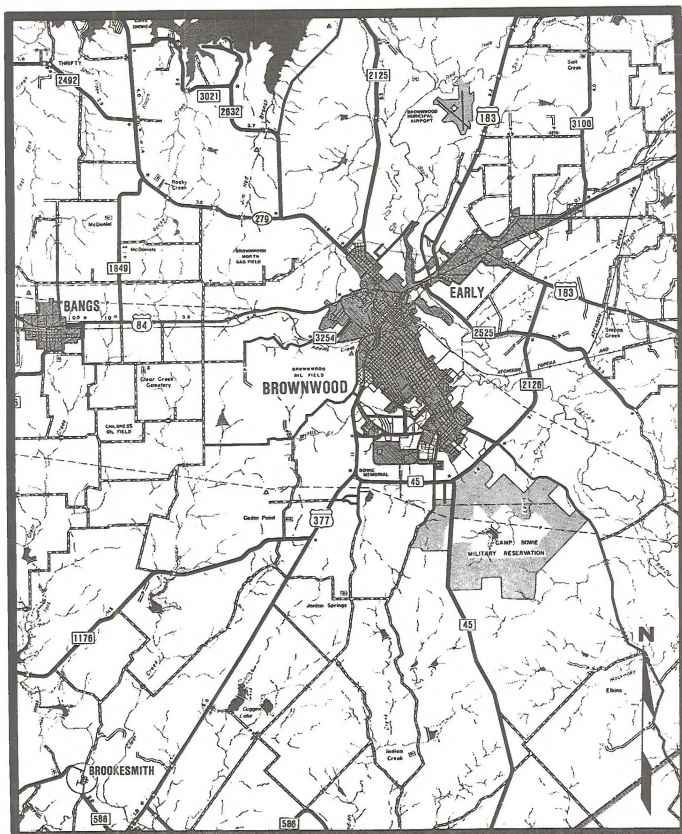
MAP 2-34

FORT WOLTERS



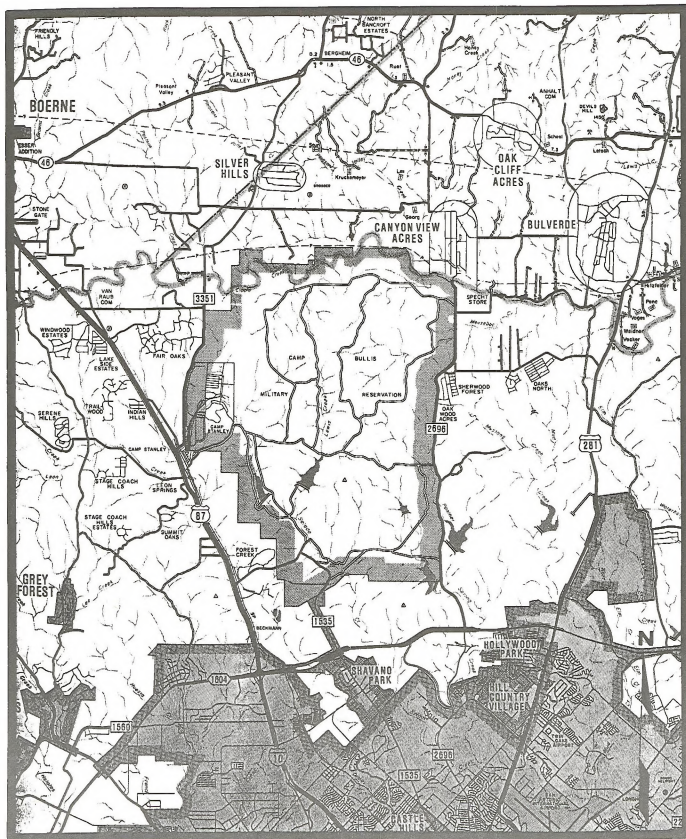
MAP 2-35

CAMP BOWIE

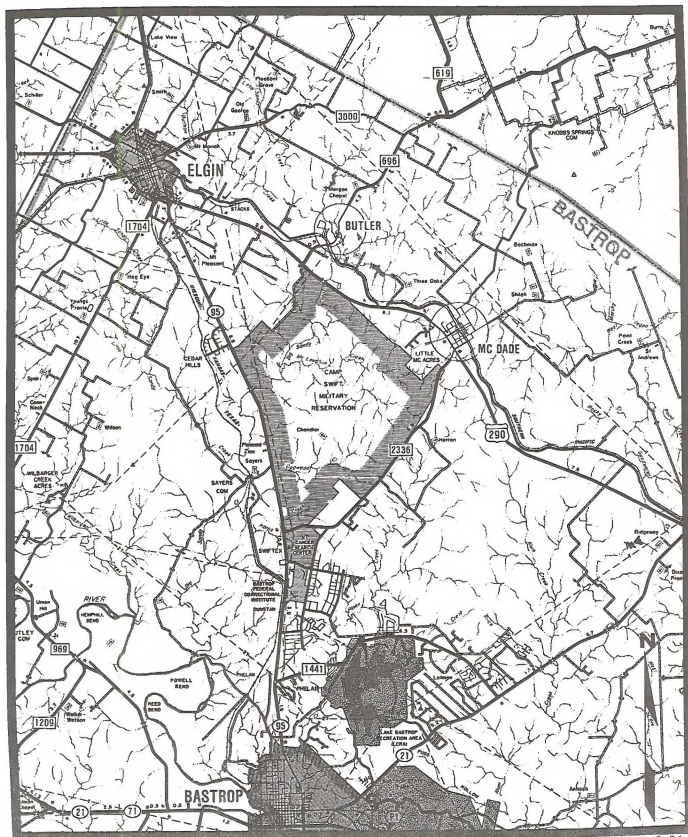


MAP 2-36

CAMP BULLIS

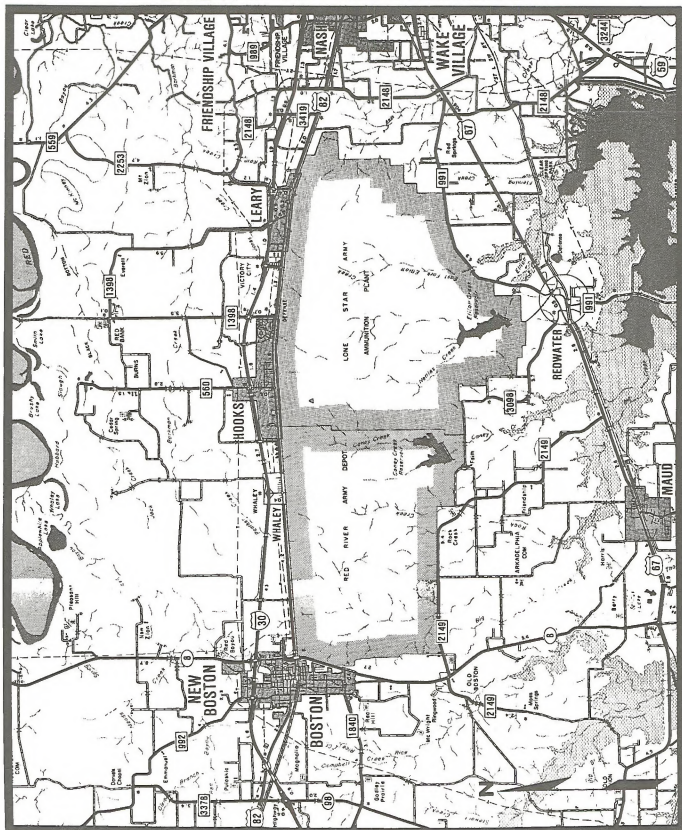


MAP 2-37
CAMP SWIFT



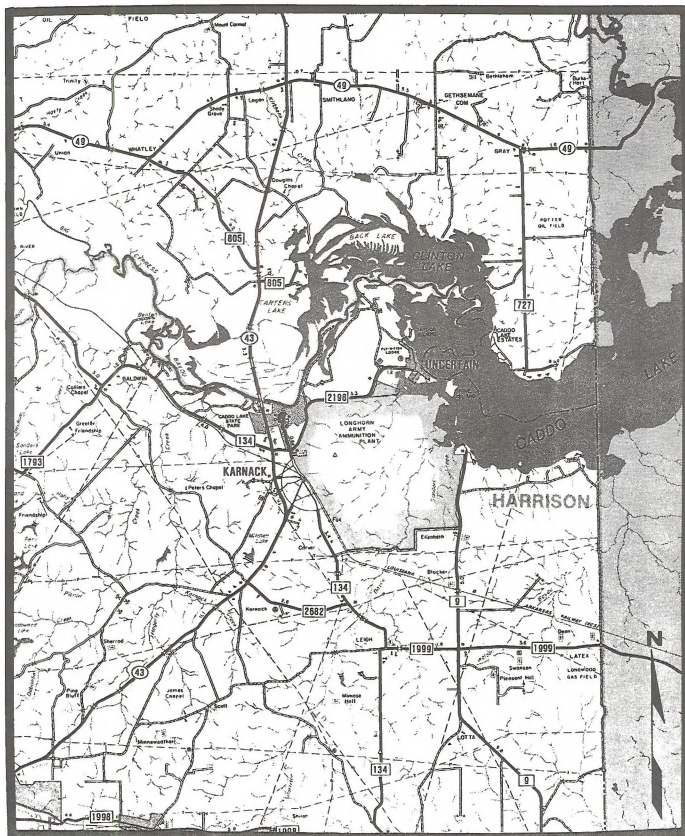
MAP 2-38

RED RIVER ARMY DEPOT AND LONE STAR AMMUNITION PLANT

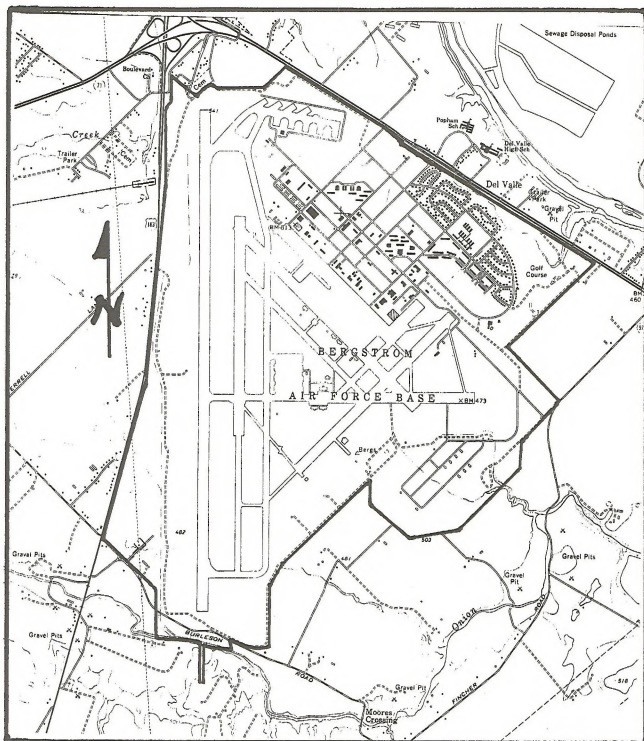


MAP 2-39

LONGHORN ARMY AMMUNITION PLANT

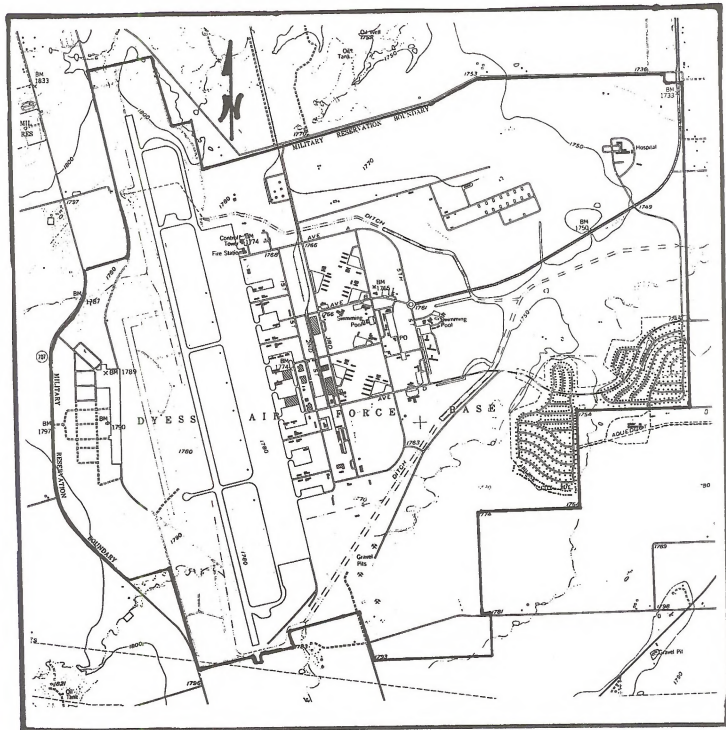


MAP 2-40
BERGSTROM AIR FORCE BASE



SOURCE: U.S. GEOLOGICAL SURVEY

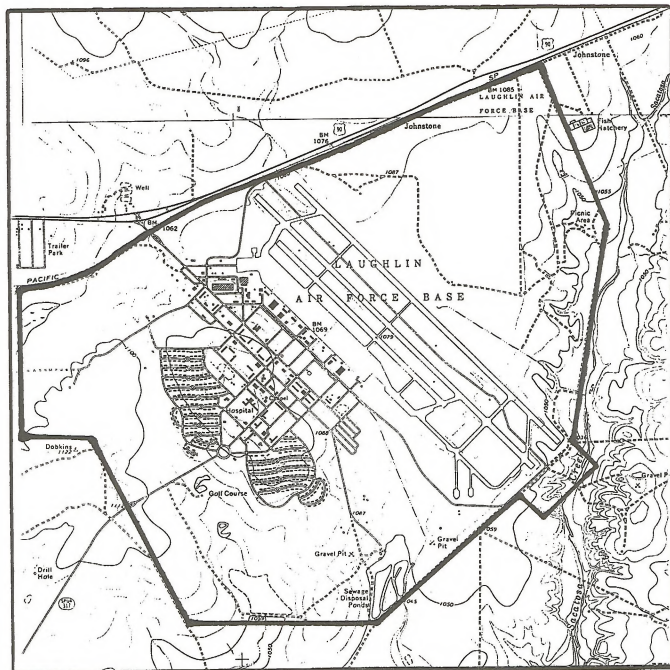
DYESS AIR FORCE BASE



2-85

MAP 2-42

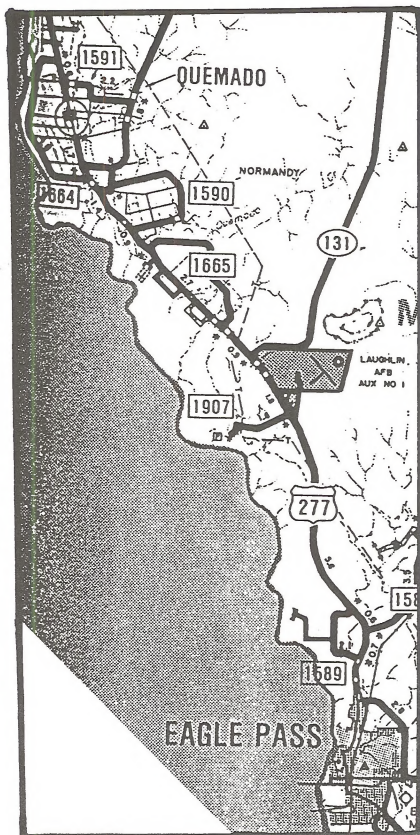
LAUGHLIN AIR FORCE BASE



SOURCE: U.S. GEOLOGICAL SURVEY

MAP 2-43

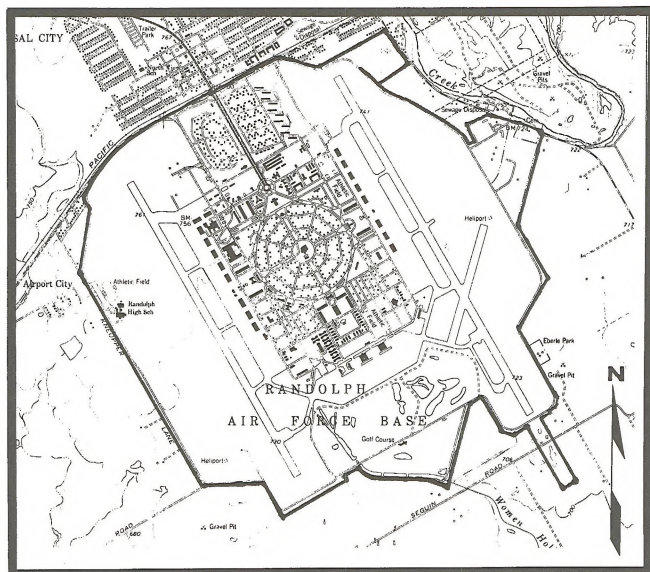
LAUGHLIN AIR FORCE BASE
AUXILIARY NO. 1



SOURCE: SHEARER PUBLISHING

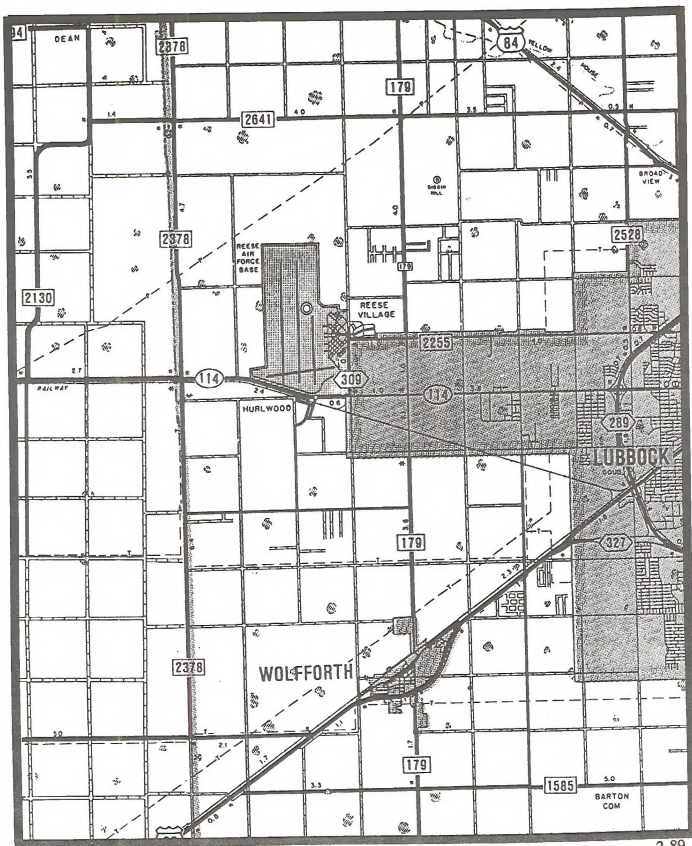
MAP 2-44

RANDOLPH AIR FORCE BASE



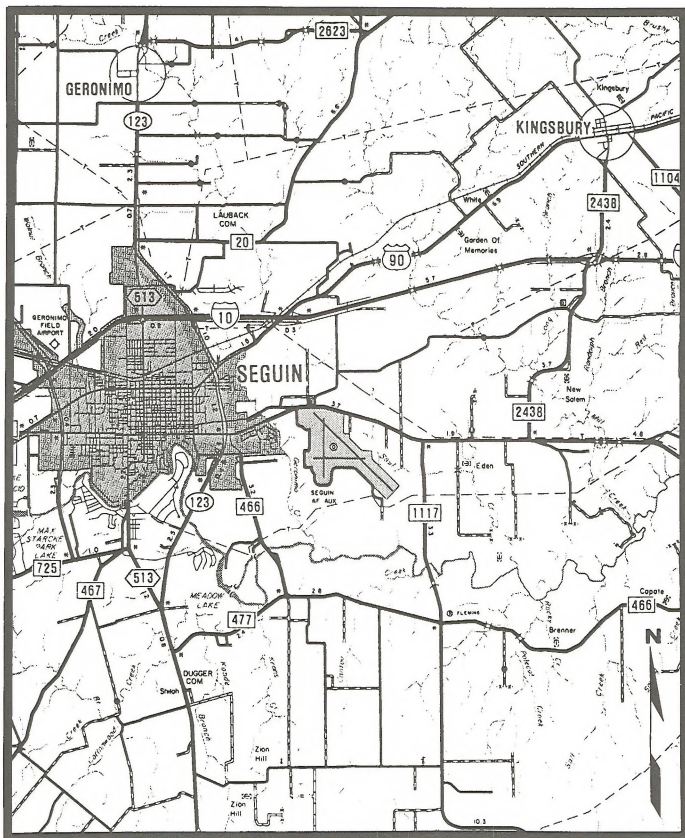
SOURCE: U.S. GEOLOGICAL SURVEY

MAP 2-45
REESE AIR FORCE BASE



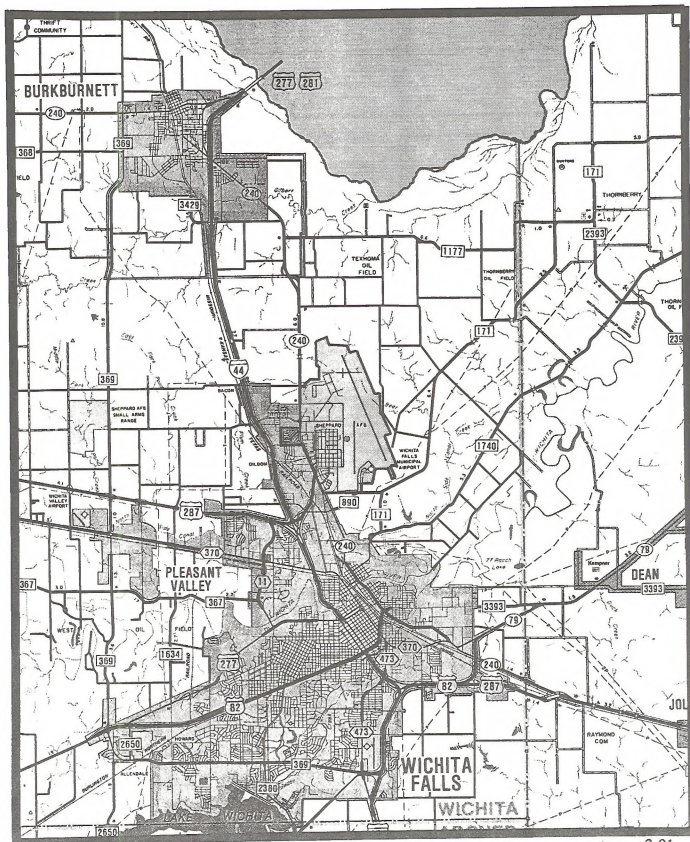
MAP 2-46

U.S. AIR FORCE
SEGUIN AUXILIARY AIRFIELD

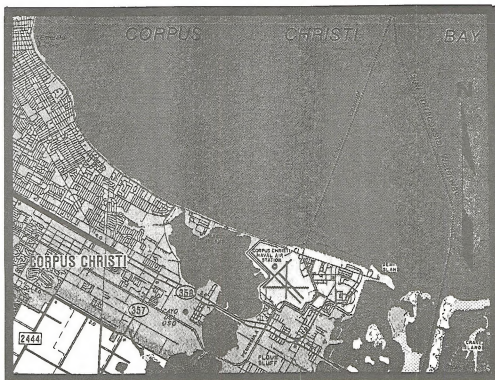


MAP 2-47

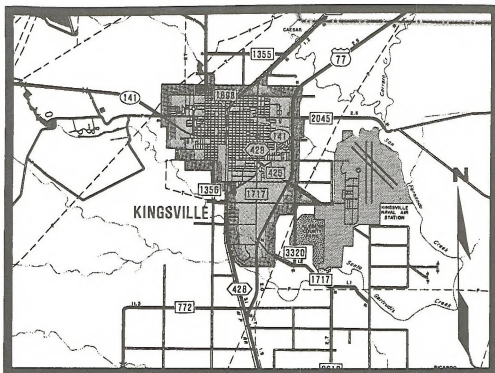
SHEPPARD AIR FORCE BASE



CORPUS CHRISTI NAVAL AIR STATION

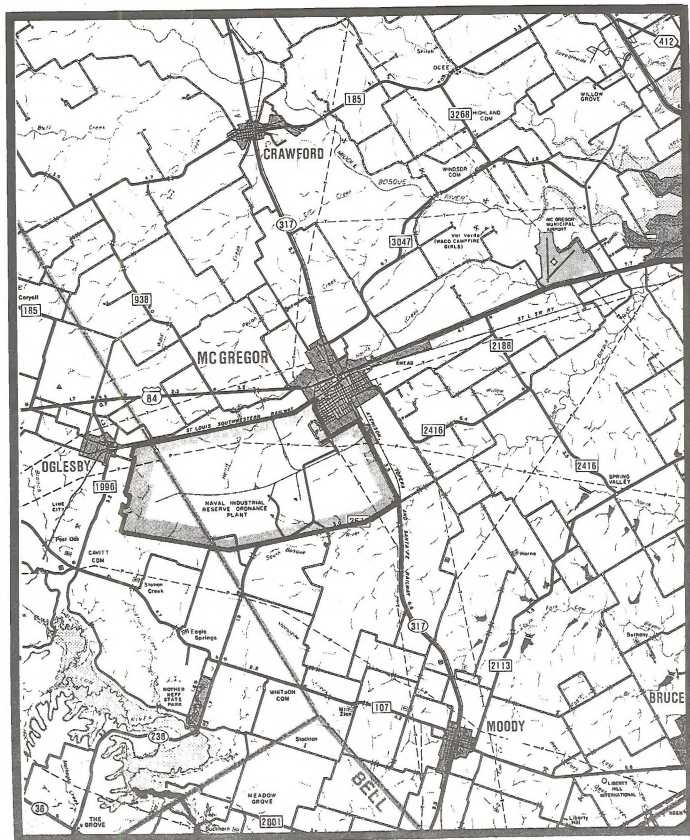


KINGSVILLE NAVAL AIR STATION



MAP 2-49

McGREGOR NAVAL INDUSTRIAL RESERVE ORDINANCE PLANT



U.S. DEPARTMENT OF AGRICULTURE

(7) Agricultural Research Service (ARS):

Brownwood, Bushland, Kerrville and Riesel facilities.

PECAN GENETICS AND IMPROVEMENT RESEARCH LABORATORY MAP 2-50

Total Area 84 acres

Description

The Pecan Genetics and Improvement Research Laboratory in the City of Brownwood, works to develop superior pecan cultivars, develop superior rootstocks, determine heritability constants for superior tree and nut characteristics, develop host plant resistance to control pecan insects and diseases and collect and maintain pecan, hickory and chestnut germplasm in the National Clonal Germplasm Repository.

SMA Lease Stipulations

NSO on approximately 84 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

CONSERVATION AND PRODUCTION RESEARCH LABORATORY MAP 2-51

Total Area 1,531 acres

Description

Located in the town of Bushland, the Conservation and Production Research Laboratory was established in the late 1930's

as a response to the devastation of the Dust Bowl era. The laboratory was a component of the Soil Conservation Service until the 1950's, when research functions were consolidated under the ARS. Research at the laboratory currently focuses on water management, soil and crop management and bovine respiratory diseases.

SMA Lease Stipulations

NSO on approximately 1,531 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

THE U.S. LIVESTOCK INSECTS LABORATORY MAP 2-52

Total Area 35 acres

Description

The U.S. Livestock Insects Laboratory was established in Kerrville in 1946. In 1977, the laboratory was reorganized to focus on research in applied basic aspects of veterinary entomology and to assume responsibility for scabies and mange research. Today, research continues to focus on the biology and control of parasitic insects, ticks and mites that affect livestock.

SMA Lease Stipulations

NSO on approximately 35 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

**GRASSLAND, SOIL AND WATER
RESEARCH LABORATORY MAP 2-53**

Total Area 1,272 acres

The USDA facility at Riesel was established in the mid-1930's to study the impact of farming systems on hydrology and sedimentation processes. In 1961, the research activities at Riesel and Temple were combined to form one unit, known since 1972 as the Grassland, Soil and Water Research Laboratory. Riesel is the work site of the main laboratory at Temple. The present mission is to develop technology for maximizing forage and crop production; revegetating depleted, brush-infested watersheds; controlling noneconomic brush and weeds; breeding forages with increased quality and yield potential; and solving problems relating to efficient use of soil and water, crop production, soil fertility, erosion, hydrology and water quality.

SMA Lease Stipulations

NSO on approximately 1,272 acres.

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

U.S. DEPARTMENT OF STATE

(8) International Boundary and Water Commission, United States and Mexico, United States Section (USIBWC): Amistad and Falcon Reservoirs.

AMISTAD RESERVOIR MAP 2-54

Total Area 65,000 acres

Description

Amistad Dam is located on the Rio Grande, 12 miles upstream from the town of Del Rio. The Amistad Reservoir has a surface area of approximately 138 square miles. In addition to the primary functions of flood control, water conservation and power generation, Amistad Reservoir also provides recreational opportunities.

SMA Lease Stipulations

NSO/ND within 2300 feet of the centerline of the dam embankment. NSO below the 1144.3 foot elevation traverse. (USIBWC Stip. No. 1)

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

FALCON RESERVOIR MAP 2-55
Total Area 87,000 acres

Description

Falcon Reservoir is located on the Rio Grande about 130 miles upstream from Brownsville. The reservoir was created in 1953 to provide power, conservation, flood control and irrigation along both sides of the border in the lower Rio Grande Valley. The 60 mile long lake is a popular recreation site and Falcon State Park is located approximately 1.5 miles from the dam site.

SMA Lease Stipulations

NSO/ND within 2300 feet of the centerline of the dam embankment. NSO below the 307 foot elevation traverse. (USIBWC Stip. No. 1)

The RMP alternative selected would result in:

Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

Alternative C. Federal minerals at this facility would not be available for lease.

U.S. DEPARTMENT OF ENERGY (DOE)

(9) DOE: Pantex

PANTEX MAP 2-56
Total Area 16,000 acres

The Pantex plant is America's only nuclear weapons assembly and disassembly facility. Located on the High Plains of the Texas Panhandle, 17 miles northeast of Amarillo, Pantex is centered on a 16,000 acre site just north of U.S. Highway 60 in Carson County.

SMA Lease Stipulations

NSO/ND on the approximately 16,000 acres controlled by the Pantex facility.

The RMP alternative selected would result in:

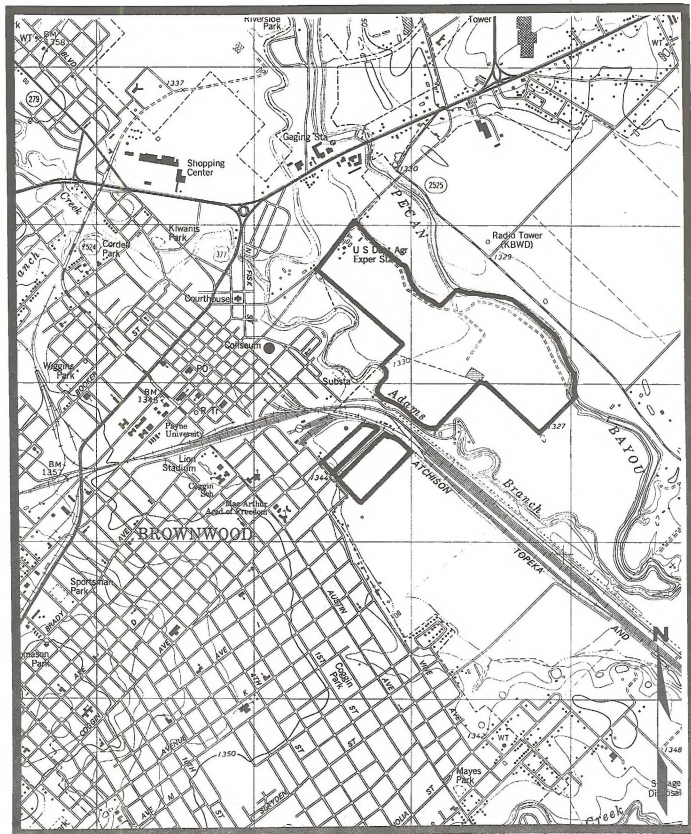
Alternative A. Should Federal minerals at this facility be available for lease, stipulations as described above would apply.

Alternative B. Same as Alternative A.

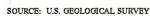
Alternative C. Federal minerals at this facility would not be available for lease.

MAP 2-50

PECAN GENETICS AND IMPROVEMENT RESEARCH LABORATORY

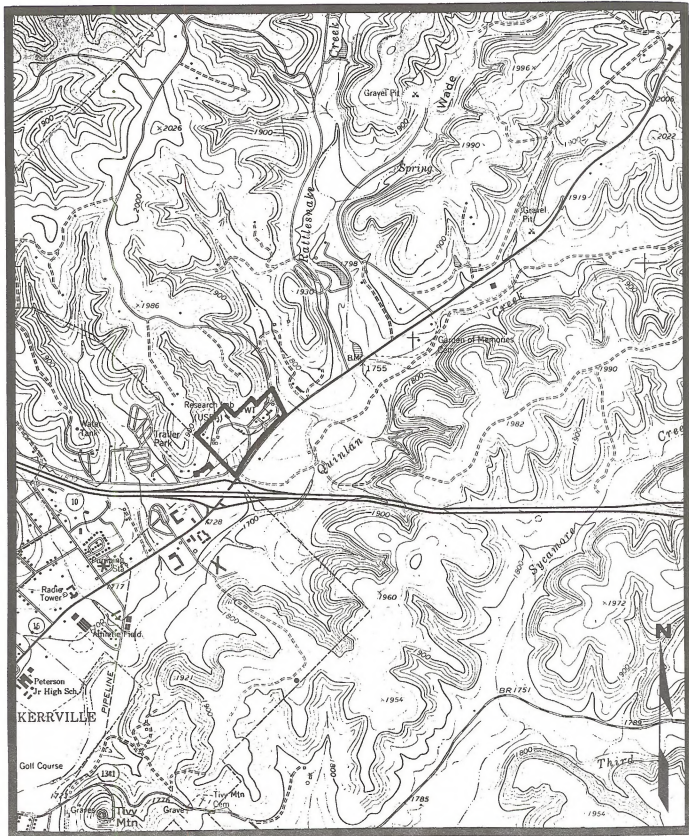


CONSERVATION AND PRODUCTION
RESEARCH LABORATORY



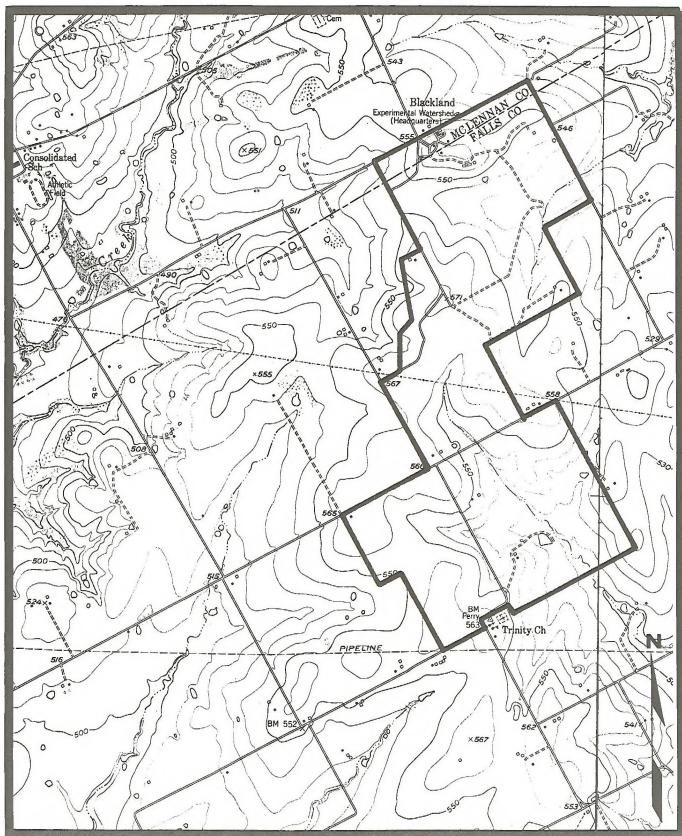
MAP 2-52

U.S. LIVESTOCK INSECTS LABORATORY



MAP 2-53

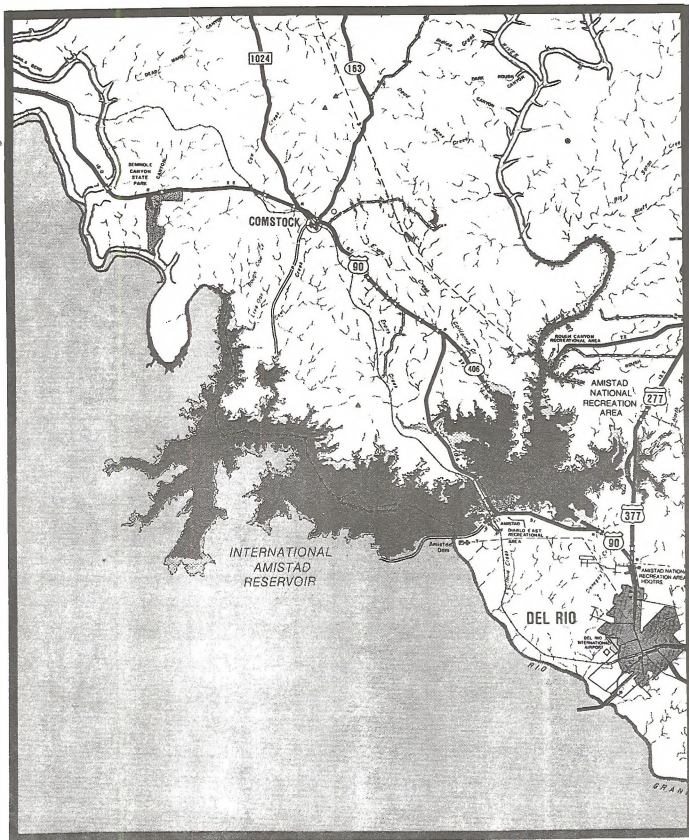
GRASSLAND, SOIL, AND WATER
RESEARCH LABORATORY



SOURCE: U.S. GEOLOGICAL SURVEY

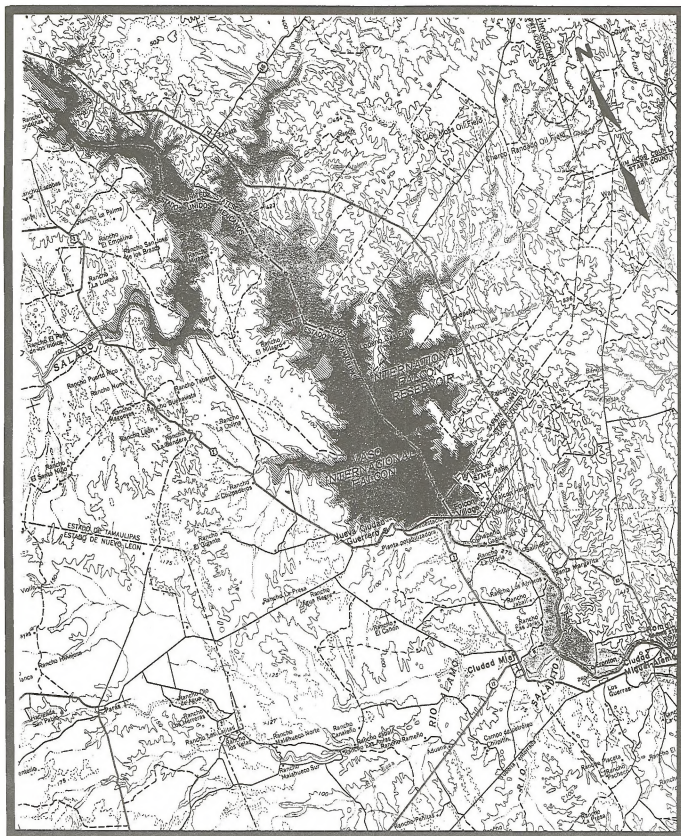
MAP 2-54

AMISTAD RESERVOIR



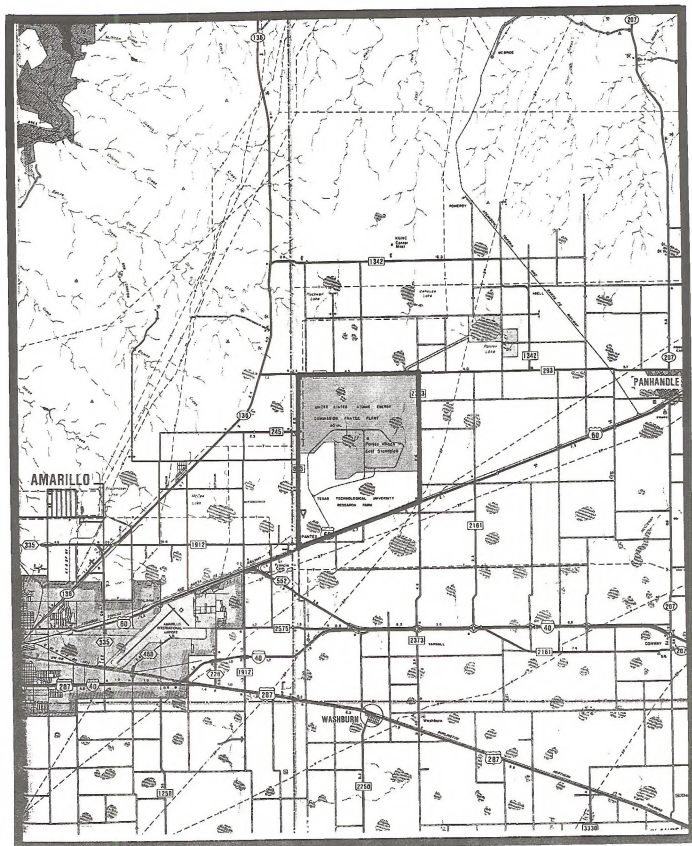
MAP 2-55

FALCON RESERVOIR



SOURCE: INTERNATIONAL BOUNDARY AND WATER COMMISSION

PANTEX



2-103

SPLIT-ESTATE TRACTS

All Federal land ownership within Texas has been acquired through purchase, foreclosure and/or donation.

When these acquired lands are no longer needed, the government disposes of these lands through transfer to non-Federal ownership. In some cases the government retains ownership of the mineral estate under those lands disposed. These severed mineral estates are known as split-estate. For oil and gas leasing purposes the BLM is the SMA for split-estate tracts within Texas.

Currently, there are approximately 30,000 acres of split-estate tracts which vary in size from less than one acre to several thousand acres, and are located throughout the state. The larger tracts result from military base closing where the minerals were retained such as Eagle Mountain Marine Corps Air Station north of the City of Fort Worth or Ellington AFB in the City of Houston.

Split-estate acreage figures will increase with future military base closing as well as the disposal of Federal surface locations within the State.

SMA Lease Stipulations

Due to the fact that the exact location of all split-estate minerals within Texas is unknown

and/or unmapped, the BLM is not able to evaluate this split-estate on a site specific basis at this time for the RMP/EIS effort. All leasing of split-estate minerals to date within Texas has required the development of site specific EAs at the time of lease application/nomination. The site specific lease stipulations are developed at the time of EA preparation.

The RMP alternative selected would result in:

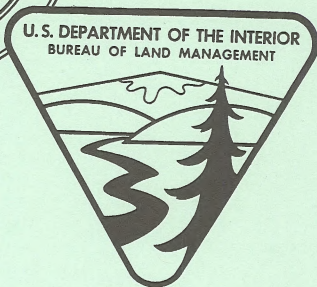
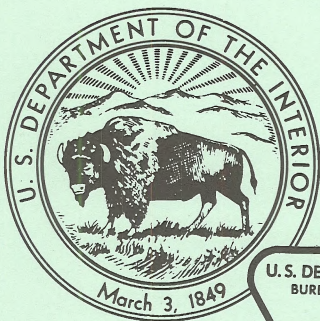
Alternative A. The applicant nominating a split-estate tract will be required to provide all necessary maps and resource information needed by the BLM to complete a site specific EA/EIS at the time of application. Following the completion of the site specific EA or EIS, the BLM will either reject the nomination or allow the parcel to be placed on a sale list for competitive bid with the appropriate leasing stipulations attached. These stipulations could be ORA-1 or ORA-2. No split-estate within city limits would be available for lease.

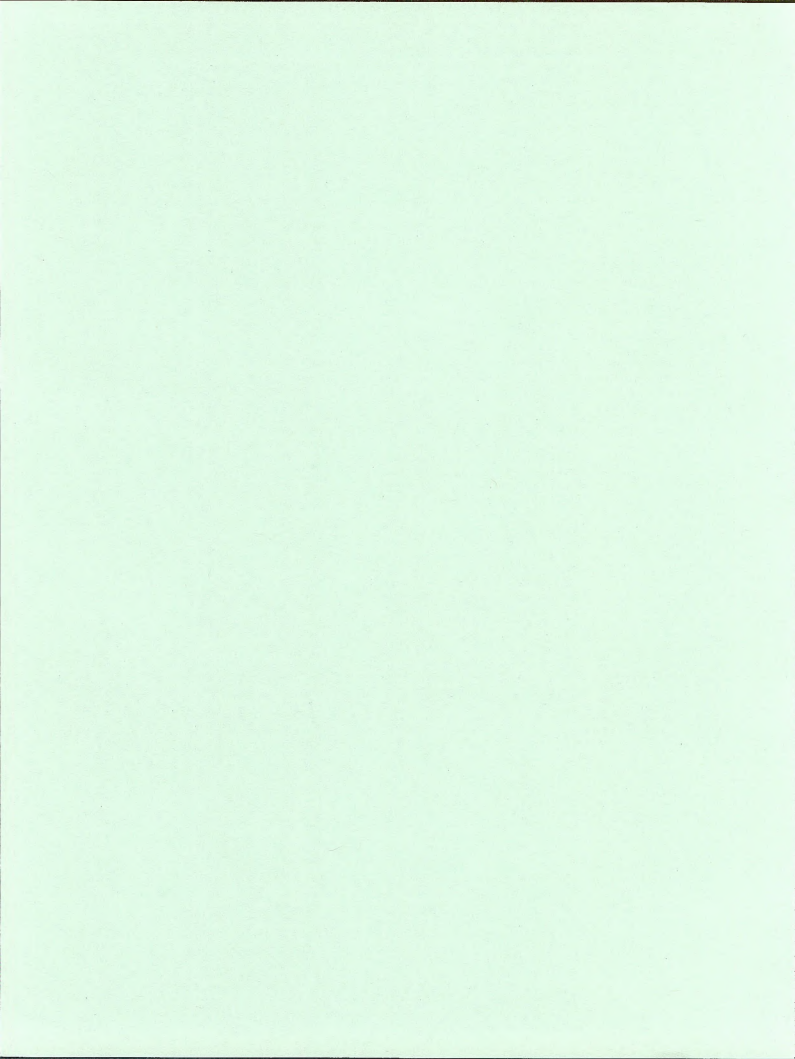
Alternative B. In addition to the requirements presented under Alternative A, lease stipulations ORA-3 and ORA-4 could be applied.

Alternative C. Split-estate would not be available for lease.

CHAPTER THREE

AFFECTED ENVIRONMENT





CHAPTER THREE AFFECTED ENVIRONMENT

INTRODUCTION

This chapter presents a description of the physical features of the planning area to be covered by the RMP/EIS as well as descriptions of the environmental components that could be impacted by implementing the alternatives. An RMP/EIS planning area is usually the size of one or two counties. However, the scattered and isolated nature of the Federal ownership within Texas, the numerous Federal SMAs and the fact that the BLM Tulsa District is responsible for Federal minerals management for the entire state precludes adherence to that formula. Therefore, the Texas RMP/EIS planning area encompasses the entire state. The size of the State of Texas, as well as the diverse ecosystems occurring within the state has resulted in a regional approach to the development of this RMP/EIS.

The BLM has adopted an ecosystem based approach to both land use planning and natural resources management. For land use planning purposes, this RMP/EIS effort will utilize ecoregion descriptions from the recently published Ecological Subregions of the United States: Section Descriptions (McNab, W. Henry; Avers, Peter E., comps. 1994. Washington, D.C.: U.S. Department of Agriculture, Forest Service. 267 p.) provided by the USFS. These ecoregions are shown on Map A1-1 and described in Appendix 1.

PHYSICAL FEATURES

The following general descriptions of the physical features of the State of Texas encompass several specific ecoregions.

The physical features of the State of Texas include its location, size, topography and

climate. These features influence and help form the environmental components which may be influenced by human actions. The physical features themselves are not subject to significant influence by mankind.

Location & Size

The State of Texas is situated in the south-central portion of the contiguous forty-eight states of the United States and is bordered by four American states; Arkansas, Louisiana, New Mexico and Oklahoma and four Mexican states; Chihuahua, Coahuila, Nuevo Leon and Tamaulipas. The area of the state is approximately 266,807 square miles, which consist of 262,017 square miles of land and 4,790 square miles of inland water. Texas is divided into 254 counties and has a coastline of 624 miles along the Gulf of Mexico.

Topography

The highest point in Texas is Guadalupe Peak with an elevation of 8,749 feet above sea level. Guadalupe and its twin, El Capitan (8,085 feet) are in West Texas near the Texas, New Mexico border. A plateau, most of it 2,600 to 4,300 feet above sea level, extends across West Texas above the Cap Rock. Below that escarpment, the surface slopes downward to sea level along the Gulf of Mexico.

All of the true mountains and most of the topographic features are found in the western half of Texas. These include the canyons of the Big Bend of the Rio Grande and its tributaries in the southwest, the Edwards Plateau, the Cap Rock Escarpment and Palo Duro Canyon. In addition to Guadalupe and El Capitan, other known, named peaks more than

8,000 feet above sea level include Shumard, 8,165 feet, Bartlett, 8,508 feet, Bush Mountain, 8,631 feet and Pine Top Mountain, 8,676 feet.

Most of the canyons of Texas are found in the Trans-Pecos, Staked Plains, Burnet-Llano and Edwards Plateau regions. The Big Bend of the Rio Grande has the famed Santa Elena gorge, with perpendicular walls of some 1,700 feet and the Boquillas and Mariscal Canyons. Tributaries of the Rio Grande form other canyons, such as the Maravillas. Other Trans-Pecos canyons include Capote, McKittrick, Pine, Limpia, Musquiz, Cherry and Madera and the Box Canyon. Along the edges of the Edwards Plateau are canyons on such rivers as the Frio, Nueces, Sabinal, Guadalupe, Medina and Devils. Palo Duro and Tule Canyons are features of the Staked Plains.

Climate

Average annual precipitation is extremely varied. The southeastern area of Texas receives over 55 inches while the western portions experience less than 12 inches. Texas has mild winters and very warm summers. A more detailed description of the climate of Texas is presented by section in the Ecoregion descriptions in Appendix 1.

Environmental Components

The environmental components that could be affected include: (1) air quality, (2) water, (3) soils, (4) vegetation, (5) wildlife, (6) cultural/historic and paleontological resources, (7) mineral resources and (8) social and economic conditions.

(1) Air Quality

This discussion of existing air quality conditions for the entire State of Texas is

extremely general due to the vast expanse of the planning area.

Ambient air pollutant levels would normally be expected to be below the measurable limits in the undeveloped rural areas of the state. Areas thought to be subject to decreasing air quality would include the immediate vicinities of industrial developments (i.e., power plants, factories, etc.) and within larger towns and cities (resultant from automobile exhaust, wood smoke, etc.).

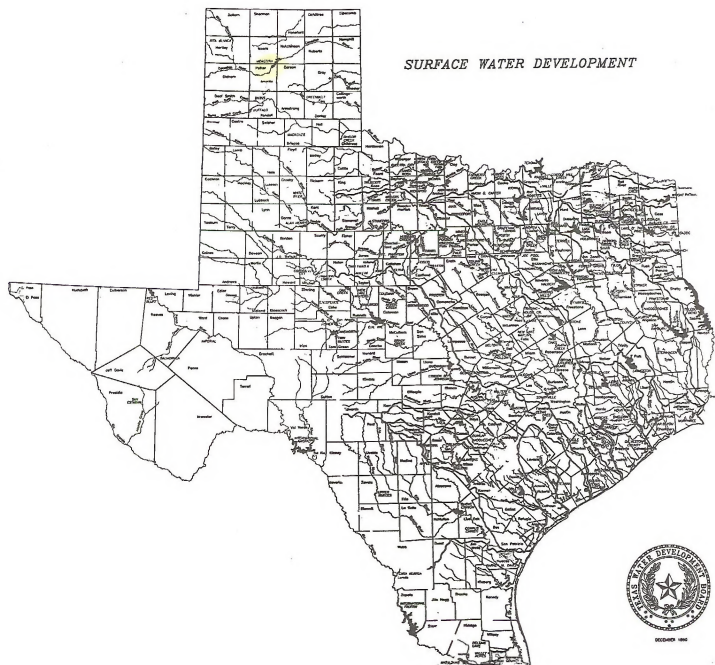
Particulate matter concentrations are expected to be higher near industrial areas, towns and cities and along unpaved roads. During periods of drought, dust storms are common and would also contribute to the total suspended particulate levels.

(2) Water Resources

Water resources descriptions are divided into surface waters and subsurface or ground waters. All water resources information has been extrapolated from various sources such as the COE, U.S. Geological Survey (USGS) and Texas Water Development Board.

Water Resources/Surface Water

Texas' abundant surface water resources include rivers, streams and both natural and man-made reservoirs as depicted on Map 3-1. There are several major river basins with surface water resources having been developed through construction of numerous reservoirs. Additional projects are planned or are now under construction.



MAP 3-1
SURFACE WATER DEVELOPMENT

Water Resources/Groundwater

Groundwater deposits underlie about 76 percent of the area of the state of Texas and it is considered to be one of the states most valuable resources. Sixty percent of the freshwater used in Texas is supplied from 23 major aquifers. Groundwater supplies are produced from numerous saturated geologic formations comprised of various mineralogic types such as sand and gravel alluviums and cavernous limestones and dolomites.

(3) Soils

The USDA's Soil Conservation Service (SCS) has completed extensive soil surveys of most counties in Texas and these documents are available as source information to the public and other Federal, state and local agencies.

Generally, soils are classified based upon the properties of texture, structure and relative ph (i.e., acidity or alkalinity). Soils develop a series of layers or horizons under the influence of environmental factors and constitute the soil profile. Thus, the soil texture and structure, as well as the depth and color of the horizons are determined by the parent materials, climate and vegetation. The varied climate and topography of Texas have combined to produce broad differences in state soils. In the eastern part of the state, soils have been developed where leaching is intense and conditions are humid. These conditions have produced soils low in phosphorous and potassium, while at the same time being moderately to strongly acid. Western soils, being developed in an area of lesser rainfall, are usually light red in color, less leached than eastern soils, moderately acidic and low in phosphorous and nitrogen. A more specific, detailed description of the soils of Texas is presented by section in the Ecoregion descriptions in Appendix 1.

(4) Vegetation

Differences in amount and frequency of rainfall, variation in soils and temperatures gives Texas a great diversity of vegetation. From the grassy plains of North Texas to the coastal and inland wetlands to the semi-arid brush lands of South Texas, plant species change accordingly.

A.W. Küchler's (1964) "Potential Natural Vegetation" types are discussed in the Ecoregion descriptions in Appendix 1.

Craig A. McMahan (et al., 1984) mapped and described 45 vegetation types (and an additional 7 subtypes) in Texas. This 1984 publication and color wall poster size map provide the most detailed and up to date depiction of Texas' vegetation types. F.W. Gould's (et al., 1960) representation of the 10 vegetational areas of Texas provides yet another system for discussing the vast array of vegetation types in Texas.

(5) Wildlife

During some part of the year, Texas is home to more species of birds than any other state. The Texas Ornithological Society has documented 570 species of birds in Texas and acknowledges another 34 species that might occur in the state. This represents about three-fourths of all the species of birds found in the entire United States. Only 24 of these species are recognized as commonly occurring throughout the state. Each ecoregion has its own distinct bird life, in both seasonal visitors and year round residents (Garrett, 1992-1993).

In addition to the rich avifauna, there are over 142 species of mammals, reptiles and amphibians which are known to occur in Texas. Texas has many native species of

wildlife and introduced exotics to be found on privately owned game preserves (Kingston, 1994-1995).

A more detailed accounting of wildlife species can be found in the Ecoregions descriptions contained in Appendix 1.

(6) Special Status Species (SSS)

SSS include, but are not limited to, Federal or state listed threatened or endangered plant or animal species, species proposed for state or Federal listing, candidate category one or two species under review by the FWS and species being considered for future listing by the state.

There are over 125 species listed as either threatened or endangered by the State of Texas (refer to species lists in Appendix 4). The Texas Natural Heritage Inventory, housed within the TPWD monitors data on hundreds of additional species which are not currently listed, but for which there is data to suggest that future state listing may be necessary.

Under the Federal ESA there are approximately 75 species of plants and animals in Texas listed as threatened, endangered or proposed for listing and more than 175 considered candidates for listing (FWS's candidate category 1 and 2 species) (refer to species lists in Appendix 4).

The state and Federal lists contain such coastal area species as the West Indian manatee and four species of whales. In the east Texas pine forest, listed species includes the red-cockaded woodpecker and Texas trailing phlox and in arid southwest Texas, the listings includes the Lloyd's hedgehog cactus and the endangered cats, ocelot and jaguarundi. The hill country in the Austin area contains caves and canyons which are habitats for SSS such as the

golden-cheeked warbler and the tooth cave pseudoscorpion.

Further insight into the complexity of the SSS program in Texas may be obtained by reviewing the "Fauna" sections within the ecoregions descriptions appearing in Appendix 1.

(7) Cultural Resources

Cultural resources as defined here include historic sites, prehistoric sites, modern sacred or ceremonial sites and unmarked Indian graves. The age of sites found in Texas ranges across nearly every archeological period in the United States. These include Paleo-Indian, Archaic, Woodland, Plains Woodland, Missippian, Plains Village, NeoAmerican, and Historic. Pleistocene or ice age sites are recorded in Texas and some have associations with extinct animals used by the first humans to occupy North America.

Counting all sites, districts, structures, objects and thematic groups (multiple resource nominations) listed on the National Register of Historic Places, as of August 1, 1995, there are over 10,000 National Register properties listed for the State of Texas. Many additional sites within the state have been considered "eligible for the National Register", but for various reasons their nominations were never completed. These "eligible" sites have important historical values, but would not be included in the number now listed as "on the National Register", although they receive similar legal protection. The "eligible" sites would be included in the list of all recorded sites compiled by the Texas Archeological Research Lab (TARL).

Based on the most recent counting of archeological sites by the TARL, in August,

1994 there were 51,502 recorded sites in the State of Texas. In the 254 counties of Texas there is a wide range of recorded sites. Ranging from one site reported in each of the three counties of Yoakum, Cochran and Hockley, clustered in northwest Texas to 4,775 recorded sites in El Paso County in far west Texas.

These records are continually updated and maintained by the Texas State Historic Preservation Office (SHPO) and TARL. The BLM has copies of some of these site records, but most of the BLM site data derives from the Texas state site files. The exact site locations are not open to inspection by the general public and are exempt from the Freedom of Information Act. Review and evaluation of sites and potential impact on sites is done on a project by project basis.

Currently, there are three Federally recognized Tribes in Texas: The Alabama-Coushatta Tribe of Texas in Polk County, the Isleta Del

Sur Pueblo (or Tigua) at El Paso and the Kickapoo Traditional Tribe of Texas which lives near Eagle Pass in Maverick County. Many other tribes had historical occupation areas in Texas, such as the Caddo, Comanche, Cherokee, Kiowa, Wichita, Tonkawa and Apache, but now have their tribal lands in Oklahoma. Other historically known tribes lived in Texas, but have been totally exterminated or assimilated, such as the Karankawan and the Coahuiltecan tribes (Newcomb, 1961). The 12 Geographic regions of Texas (Arbingast, et al., 1973) commonly used by archeologists can be lumped roughly into the 4 USFS main Ecoregions of Subtropical (231), Prairie (255), Tropical-Subtropical Steppe (315), Tropical-Subtropical Desert (321). Table 3-1 shows the increase in number of recorded sites over 10 years and compares the number of archeological sites to the number of acres per Ecoregion to give the average density of archeological sites in each Ecoregion.

TABLE 3-1
ARCHEOLOGICAL SITES BY ECOREGION

ECOREGION	[1] 1985 DATA # OF RECORDED SITES BY REGION	[2] NUMBER OF ACRES BY REGION	[3] 1994 DATA # OF RECORDED SITES-REGION	[4] 1994 DATA # OF ACRES PER SITE (Average) (Density)
1. Subtropical (231) [36 counties]				
a. Pine Woods Region	1,705	17,029,723		
Subtotal	1,705	17,029,723	6,278 (12%)	2,712
2. Prairie (255) [90 counties]				
a. Gulf Coast Plain	2,029			
b. Post Oak Belt	2,279			
c. Blackland Prairie	1,193			
d. Grand Prairie	1,092			
e. Cross Timbers	703			
Subtotal	7,296	40,327,062	15,862 (31%)	2,542
3. Tropical/Subtropical Steppe (315) [140 counties]				
a. South Texas Plain	1,255			
b. Llano Basin	415			
c. High Plains	1,344			
d. Lower Plains	2,009			
e. Edwards Plateau	2,455			
Subtotal	7,478	86,044,025	18,454 (36%)	4,662
4. Tropical/Subtropical Desert (321) [21 counties]				
a. Mountain/Basin Region	3,661			
Subtotal	3,661	26,924,861	10,908 (21%)	2,468
TOTAL	20,140	170,325,671*	51,502 (100%)	3,096

* (# does not include river bed or offshore acres underwater)

Two key observations are possible in examination of Table 3-1. First, the number of recorded archeological sites in the ten years from 1985 to 1995 has more than doubled. In the Mountain and Basin Region and the Pine Woods Regions the number of recorded sites tripled in those ten years.

The second observation based on column [4] of the table is that dividing the number of acres by the number of recorded sites will yield an average density of sites in that Ecoregion in 1,000's of acres per site. Using this procedure, the order of high to low density of sites in each Ecoregion is:

1. Tropical/Subtropical Desert, 2,468 acres per site.
2. Prairie, 2,542 acres per site.
3. Subtropical, 2,712 acres per site.
4. Tropical/Subtropical Steppe, 4,662 acres per site.

This density order is surprising considering that the Ecoregion with the largest number of archeological sites and the largest number of acres (Tropical/Subtropical Steppe) has the lowest density of sites of the 4 Ecoregions in Texas.

Evaluations of the cultural resources in Texas are based largely on the regional archeological overviews including: (Hofman, et al. 1989), (Hester et al. 1989), (Story, et al. 1990), (Simmons, et al. 1989) and (Gunnerson 1987).

(8) Paleontological Resources

Paleontological resources located in Texas on Federal surface are only partially recorded. If significant paleontological sites are discovered during a BLM permitted action in Texas, professional paleontologists would be contacted to help evaluate and decide whether mitigation

was necessary. As standard procedure, the archeologists who perform cultural inventories for BLM permitted projects are asked to report any exposed fossils that may be impacted by construction or surface disturbance.

(9) Minerals

Geology/Surface Geology

Of the eight major physiographic regions of the United States, five are found within Texas. These are: 1. The Gulf Coastal Plains, 2. The Interior Lowland, 3. The Llano Estacado or Staked Plains, 4. The Edwards Plateau and, 5. The Great Basin or Basin and Range Province. Each of these regions is described below, as well as in the Ecoregion descriptions in Appendix 1.

1. The Gulf Coastal Plains, extending from the Atlantic to beyond the Rio Grande, were once an ocean floor. The Balcones Escarpment, running roughly in a curved line from Del Rio on the Rio Grande, through San Antonio, Austin and Temple, is the interior boundary of the Coastal Plains. North of the Brazos River, that boundary is marked by the contact between the harder Lower Cretaceous rock on the west and the softer Upper Cretaceous material on the east. The elevation varies from less than 950 feet at the extreme southwestern end of the region to sea level along the Gulf Coast. Low barrier islands offshore form shallow bays and lagoons next to the mainland. The Balcones Fault Line is a single, definite geologic feature, accompanied by a line of southward and eastward-facing hills. This fault line is usually accepted as the boundary between lowland and upland Texas. South of this fault line the surface of the ground is characteristically coastal plains. North of the Balcones Fault the surface of the ground is characteristically interior rolling plains.

2. The Interior Lowland extends from Canada to west central Texas. Elevations within Texas range from approximately 1,000 feet on the east to 2,200 feet at the base of the Cap Rock Escarpment on the west. The relatively level prairies and undulating plains give way toward the western extremity of this region to badlands topography of sheer cliffs and colorful canyons created by erosion of Triassic and Jurassic rocks.

3. The Llano Estacado (Staked Plain), part of the High Plains and Plateaus region, is in West Texas. The Llano Estacado is relatively level without distinguishing landforms except where streams intersect or where playas catch runoff water. Elevations range from approximately 2,500 feet to 4,500 feet. The Cap Rock Escarpment is the dividing line between the high plains and the lower rolling plains of West Texas. Like the Balcones Escarpment, the Cap Rock Escarpment is an outstanding natural boundary line. Unlike the Balcones Escarpment, the Cap Rock Escarpment is caused by surface erosion. In many places this escarpment is a striking physical feature, rising abruptly from 200 to 500 feet and, in some places, almost 1,000 feet above the plains. Where rivers issue from the eastern face of this escarpment, there frequently are notable canyons. The Palo Duro Canyon on the main channel of the Red River and the breaks along the Canadian River as it crosses the Panhandle north of Amarillo are examples.

4. The Edwards Plateau is on the southeastern end of this region, with the Balcones Escarpment at its eastern boundary. On the Edwards Plateau, known as the Texas Hill Country, elevations range from 850 feet on the east to 4,000 feet at the base of the mountains west of the Pecos River. The Edwards Plateau is composed of a massive accumulation of extremely durable Lower Cretaceous limestone

that is almost indestructible in the semi-arid climate.

5. The Great Basin, or Basin and Range Province, is an extension of the terrain found in portions of the American West and northern Mexico. It consists of broad interior drainage basins interspersed with scattered fault-block mountain ranges. The highest elevation in Texas, Guadalupe Peak at 8,751 feet, is in this region. The area of the Guadalupe Mountains along the Texas, New Mexico boundary is also considered to be part of the Rocky Mountains region, another major physiographic region in the United States.

Geology/Subsurface Geology

Anadarko Basin and Amarillo Uplift

The western portion of the Anadarko Basin is present in the northeastern part of the Texas Panhandle. This basin is one of the deepest and most prolific hydrocarbon producers in the continental United States. Although up to 40,000 feet of Cambrian to Permian sediments are present along its northwest-trending depocenter, located immediately north of the Wichita-Amarillo Uplift in Oklahoma, the maximum amount of sediment present in the Texas Panhandle is not much in excess of 20,000 feet. The Anadarko Basin becomes progressively more shallow to the west and north in the Panhandle area where it is bounded on the south by the Amarillo Uplift, the west by the Cimarron Arch and to the north by the broad shelf of the Hugoton Embayment.

Palo Duro, Dalhart, Hardeman Basins and Matador Arch

The Palo Duro Basin is an asymmetric intracratonic basin which occupies the southern half of the Texas Panhandle. The Palo Duro

Basin is bordered by the Amarillo Uplift to the north and the Matador Arch to the south. The Dalhart Basin to the northwest, the Hardeman Basin to the east and the Tucumcari Basin to the west, in New Mexico, are separated only by structural highs and have somewhat similar geologic histories. The Matador Arch is an east-west structural trend composed of isolated high areas commonly bounded by faults.

Only about 10,000 feet of sediments or less are present in the deeper portions of the Palo Duro Basin, which is filled by sedimentary rocks of mostly Mississippian, Pennsylvanian and Permian age. The deepest parts of the Dalhart Basin contain only about 9,500 feet of sediments. The tectonic activity that formed these basins began in Late Mississippian or Early Pennsylvanian.

Permian Basin Region

The Permian Basin is one of the largest Middle Devonian-Middle Triassic structural basins in North America. It was penecontemporaneously filled mainly with Paleozoic sediments. It acquired its present structural form by early Permian time and was further accentuated by tectonic activity and downwarping during the Permian and Triassic Periods. The region is divisible into several distinct structural and tectonic elements. They are the Central Basin Platform and the Ozona Arch, which separate the Delaware and Val Verde Basins on the west from the Midland Basin on the east; the Marfa Basin, separated from the Delaware Basin by the Diablo Platform; the Northwestern Shelf on the southern extremity of the Perdenal Uplift and Matador Arch; and the eastern Shelf on the western periphery of the Bend Arch.

From Cambrian through Late Mississippian time, the Permian Basin was a relatively stable, gently dipping, uniform marine shelf area, which gradually developed into a marine basin

with surrounding peripheral shelves. From Late Mississippian to Early Permian time, the region was subjected to intense structural deformation and orogenic movement. This culminated in the development of the present identifiable tectonic elements. Coarse clastic sediments were deposited near the basin shorelines and graded seaward into limestones and extensive reef development. During Permian time, reef development was extensive, especially along basin hingelines and the deep basins became progressively smaller as they became sediment filled. The Paleozoic era was brought to a close with the widespread formation of evaporite and red bed sequences in the Late Permian. Representative stratigraphic sections of all Paleozoic systems are present and reach a maximum combined thickness in excess of 25,000 feet. However, most of the sediments are restricted to thicknesses of less than 15,000 feet.

Marathon Fold Belt, Diablo Uplift and Marfa Basin (Trans-Pecos Area)

The Trans-Pecos area is located in extreme southwestern Texas along the Rio Grande River and includes all or part of El Paso, Hudspeth, Culbertson, Jeff Davis, Presidio, Brewster and Pecos Counties. It includes many highly complex subsurface geologic features including all or part of the Ouachita-Marathon Structural Belt, the Laramide Thrust Belt, the Marfa Basin, the Diablo Platform and numerous smaller structural features. Deformation and volcanism of the Basin and Range Province was later imposed on all of the above features in the Trans-Pecos area.

The Marathon Fold Belt covers most of Brewster County and the most southern portion of Pecos County. It is described as a structurally complex area that has been the site of large scale subsidence, thick sedimentary

accumulations and intense folding and faulting associated with thrusting.

This entire area is intensely and complexly faulted and fractured. The Permo-Pennsylvanian was a major tectonic period for the Trans-Pecos area. The early Tertiary was another period of uplift and erosion that was later followed by explosive volcanic activity during middle and late Tertiary. This resulted in a blanket of volcanic rocks, up to 3,000 feet thick, over the Marfa Basin and some adjoining areas, along with intrusives of the same age.

Several hundred caves of the Edwards Plateau and other rugged areas of Texas are known. Many are listed in the Texas Cave Survey and index. A few noteworthy caves include, by counties: Longhorn Cavern in Burnet; Wonder Cave in Hays (name changed to Wonder World to include park area); Natural Bridge Cavern in Comal; Devil's Sinkhole, Palace, Dragool, Kickapoo and Green Caves in Edwards; caverns of Sonora and Feltron Cave in Sutton; Cascade Caverns and the Century Caverns in Kendall; Indian Creek, Rambie's and Frio Bat Caves in Uvalde; Fern, Diablo, Fawcett and Lead Caves in Val Verde; Marathon Cave in Brewster; 0-9 Water Well Cave in Crockett and Menard Count's Jack Pit Cave, with 19,000 feet of passage, the longest officially mapped Texas cave. Inner Space Cave near Georgetown, was discovered in the 1960's.

(10) Socio-Economics

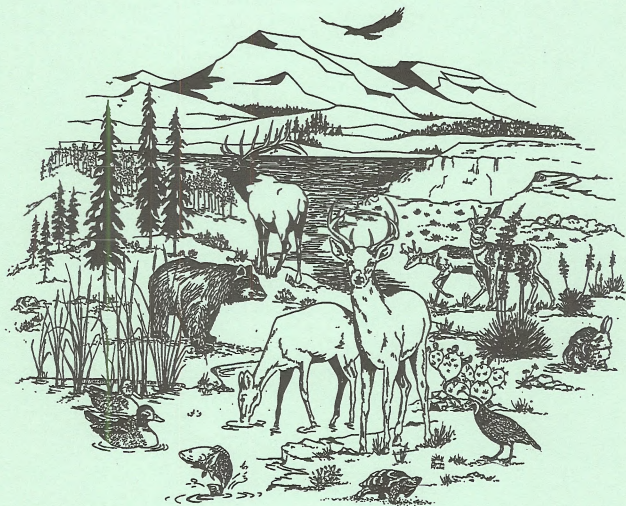
Texas is the third most populous state with over 17 million people, however, much of its land area is used for agricultural purposes. Over 81 percent of the population resides in the metropolitan counties surrounding the larger cities. Texas ranked second in the United States in cash receipts from agriculture and ranked first in cattle production in 1990. While no estimates of rural vs. urban land uses were located, these figures indicate a predominately urban population with large areas of lower population densities.

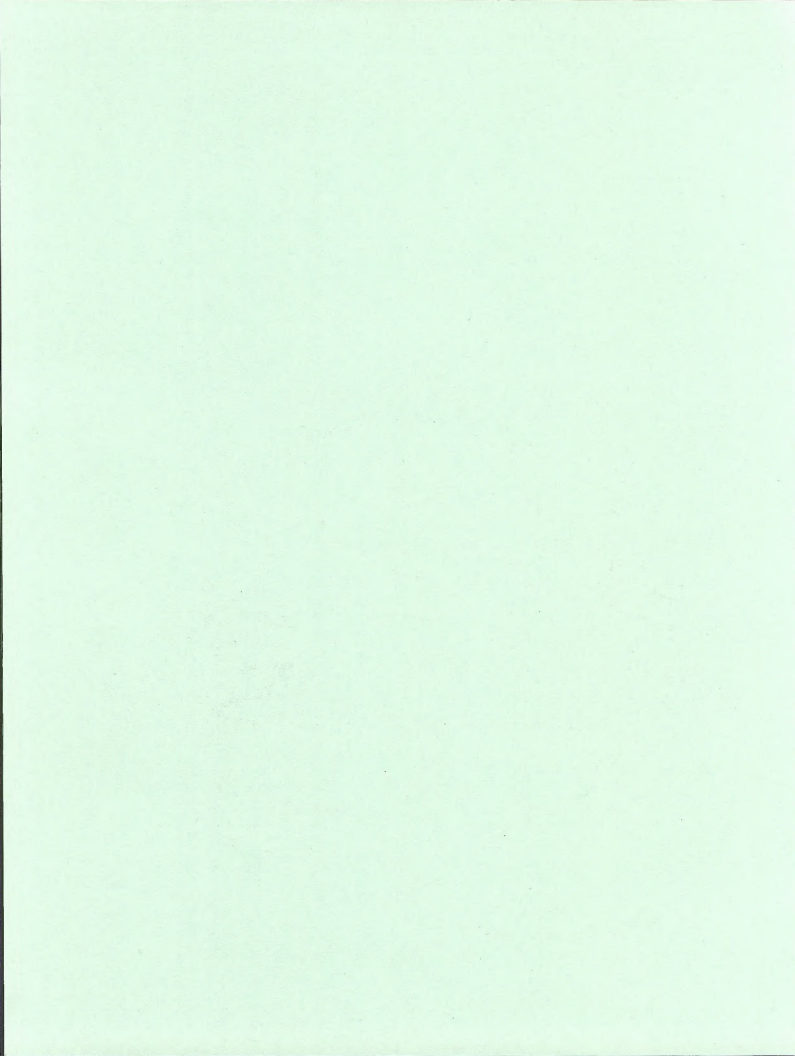
Oil and natural gas are the most valuable minerals produced in Texas, contributing 28 percent of the oil production and 33 percent of the gas production in the United States in 1984. Oil and gas have been produced from most areas of Texas and from rocks of all geologic eras except the Precambrian. All of the major sedimentary basins of Texas have produced some oil or gas. The well known Permian Basin of West Texas has yielded large quantities of oil since 1921 and it is an area of considerable promise for future production as well. Although large quantities of petroleum have been produced from rocks of Permian age, production in the area also occurs from older Paleozoic rocks. Production from rocks of Paleozoic age occurs primarily from the North Central Region westward to New Mexico and southwestward to the Rio Grande, but there is also significant Paleozoic production in North Texas in Tarrant, Grayson and Cooke counties.



CHAPTER FOUR

ENVIRONMENTAL CONSEQUENCES





CHAPTER FOUR

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter analyzes the impacts which would result from implementing any of the three RMP alternatives. The alternatives under consideration are Alternative A, in which there would be no change from the present management, Alternative B, which would provide management with additional surface protection measures and Alternative C, which would eliminate oil and gas leasing.

This chapter also analyzes the cumulative impacts resulting from CMG which are common to all alternatives and would likely occur no matter which alternative is selected. This chapter further analyzes the anticipated impacts of the issue as it relates to each of the alternatives.

Knowledge of the area and professional judgement, based upon observation and analysis of similar conditions and responses in similar areas, have been used to infer environmental impacts where data are limited. The "long-term", for purposes of the analysis in this document, is 20 years and the "short-term" is 5 years.

The analysis of unavoidable adverse impacts, short-term versus long-term productivity, and irreversible and irretrievable impacts is discussed, by alternative, in the impact analysis for each resource rather than under a separate heading. If irreversible and irretrievable impacts or short versus long-term productivity are not discussed in a given section, there are none.

In order to accomplish an analysis of the cumulative impacts of Federal oil and gas leasing and development within Texas, it was necessary to develop certain assumptions

concerning the level of activity that may occur over the optimum 20 year life of the RMP.

The BLM has prepared an evaluation of the potential for the occurrence and development of Federal oil and gas within the state of Texas. This evaluation, called the Fluid Minerals Assessment (FMA), available for review at the BLM, contains the Baseline Reasonable Foreseeable Development (RFD) scenario. The RFD scenario evaluates historic oil and gas activity and presents this as trends and projections. The RFD assumptions specifically dealing with the number of Federal wells which could be expected to be drilled, area of disturbance and well distribution were used in developing the impact analysis of each alternative.

In order to analyze potential cumulative impacts of Federal oil and gas leasing, an estimate of total number of Federal wells to be drilled over the life of the plan was made. The RFD projection is for the development of over 103,200 wells (both non-Federal and Federal) to be drilled within Texas during the next 20 years based upon current economic conditions and drilling trends from the years 1985-1991.

For planning purposes, this projection is further refined to estimate that 20 Federal oil and gas wells will be completed each year in the planning area over the next 20 years. This estimate is based upon the percentage of Federal mineral ownership (less than 1 percent) and the fact that 60 percent of the Federal development is on U.S. Forest Service lands not included in the planning area.

The estimated number of Federal wells will be the same for Alternatives A and B. The

additional stipulations applied under Alternative B would not reduce anticipated activity, but would control timing of lease operations and could add additional costs. As oil and gas fields are depleted, oil and gas drilling activity would decrease under Alternative C. As existing lease acreage is reduced by nonproduction, fewer wells would be drilled to hold depleted fields. For land use planing purposes under Alternative C, 1,000 acres of Federal lease termination annually due

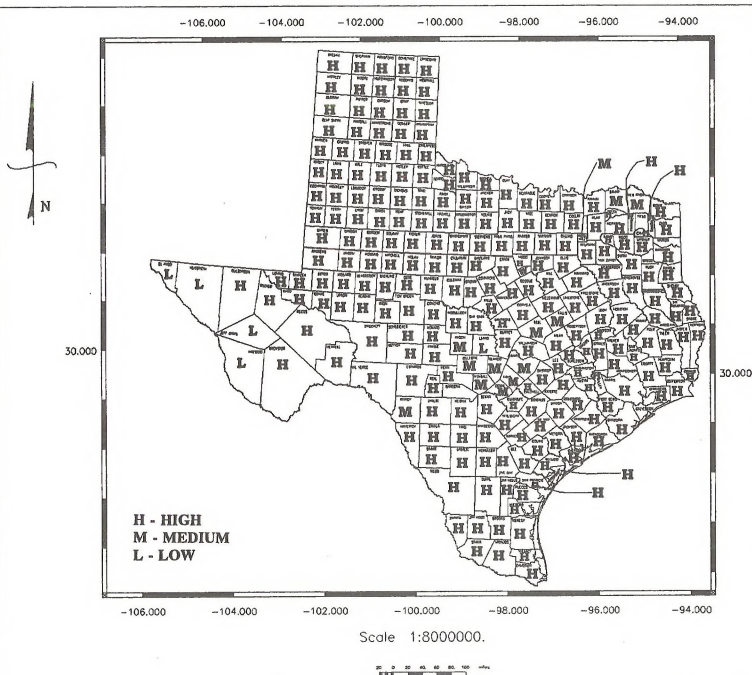
to nonproduction would result in less than half the projected activity estimated for Alternatives A and B. Another product of this evaluation are maps which display the Potential for Conventional Oil and Gas Occurrence (Map 4-1), Oil and Gas Proved Reserves Potential (Map 4-2) and Oil and Gas Development Potential (Map 4-3) which display the areas in the state where this oil and gas activity will likely take place.

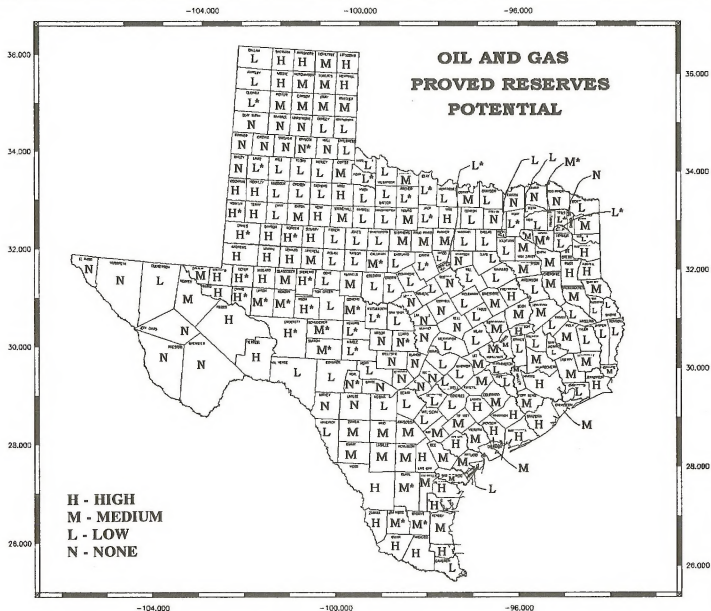
POTENTIAL FOR CONVENTIONAL OIL AND GAS OCCURRENCE

SOURCE: BUREAU OF LAND MANAGEMENT

MAP 4-1

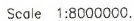
4-3





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OIL AND GAS LEASING AND DEVELOPMENT

The following assumptions were used to analyze each alternative:

1. Oil and gas drilling activity will slowly increase in Texas over the next 20 years. As reserves are depleted, a stable demand will result in a need for more discoveries.
2. The percentage of new oil and gas well starts on Federal minerals will continue to be less than one percent of total wells drilled in Texas. Federal minerals make up less than one percent of mineral ownership within the state and do not always occur in productive areas.
3. Drilling activity on Federal minerals will occur within existing fields or as an extension (within 2 miles) of these fields. The majority (more than 50 percent) of the wells projected for Alternatives A and B, and all of the wells projected for Alternative C, will be drilled on lands already under lease (as of 1995).
4. If leased, isolated tracts of Federal minerals of less than 40 acres in size would not be drilled except as a last resort by a prudent operator. Small tracts are typically grouped with other developed tracts into a communitization agreement.
5. The laws and regulations pertaining to Federal minerals management as well as BLM policies and procedures will not change substantially over the next 20 years.
6. All lease terms, conditions and stipulations will be adhered to and will be effective in mitigating potential impacts.
7. Reclamation procedures will be completed and will be successful.

The baseline RFD scenario would apply to both Alternative A and B. This development scenario would be expected with no change in current management as well as with an increase in environmental protection at the lease stage. As the preceding assumptions would indicate, the differences between the RFDs for the three alternatives are minor.

Land surface needed for an oil and gas well site varies somewhat with the well location, depth and type of equipment used to drill the well. Drill sites usually range from one to several acres in size, with deeper wells requiring more area due to larger drilling rigs, additional ancillary facilities and the need for more equipment and supplies than shallow wells. The estimated average size of a drill pad for the purpose of this planning effort is 3.4 acres.

Deep wells may require a year or more to drill, whereas, shallow wells take only a few days. Based upon the information presented in the RFD, the assumption is made for planning purposes that most Federal wells will be completed in a short time (3-4 weeks) with adequate time for revegetation or rehabilitation during the first year.

Producing oil wells, particularly flowing wells, require a smaller area than drilling sites and pumping wells. Gas wells generally involve even less surface area than oil wells due to less production equipment being required. Completed wells, with tank batteries for separating liquids and storage of production, occupy a half acre or less. For the purpose of this planning effort, the assumption is made that 2.9 acres of a 3.4 acre drill pad will be revegetated or rehabilitated during the following year. Typically, this land is returned to its previous use.

Temporary access roads, 16 to 40 feet wide, are built to well locations in such a manner that reclamation will be easier and less costly in the event of a dry hole. Usually, the most direct or least costly route to a well site is from an existing road and will normally not exceed one mile in length. Approximately two and one-quarter acres of surface disturbance for roads and pipelines are used for the purpose of this planning effort.

The anticipated short-term surface acres disturbed by Federal oil and gas wells is presented on Table 4-1. The surface disturbance anticipated to be remaining following rehabilitation or revegetation after the first year is presented on Table 4-2. Specific rehabilitation or revegetation requirements will be established by the BLM at APD stage.

TABLE 4-1
ESTIMATED SHORT-TERM SURFACE
DISTURBANCE CAUSED BY FEDERAL
OIL AND GAS ACTIVITY IN TEXAS
BY ALTERNATIVE

ALTERNATIVE		AVG. #	ACRES	TOTAL
		WELLS PER YEAR	PER WELL*	DISTURBED PER YEAR
Alt. A	Continuation of Present Management	20	5.65	113
Alt. B	Intensive Surface Management	20	5.65	113
Alt. C	No Leasing	10	5.65	56.5

* Drill pad and access road
(Source: BLM)

TABLE 4-2
ESTIMATED SURFACE DISTURBANCE
CAUSED BY FEDERAL OIL AND GAS
ACTIVITY IN TEXAS BY
ALTERNATIVE FOLLOWING
REHABILITATION AFTER ONE YEAR

ALTERNATIVE		AVG. #	ACRES	TOTAL
		WELLS PER YEAR	PER WELL*	DISTURBED PER YEAR
Alt. A	Continuation of Present Management	20	2.75	55
Alt. B	Intensive Surface Management	20	2.75	55
Alt. C	No Leasing	10	2.75	27.5

*Drill pad and access road
(Source: BLM)

Most oil and gas fields range from less than 1,000 acres up to many thousands of acres in size. Field development practices vary widely depending on the nature and characteristics of each individual field. Generally, oil wells are drilled on 40-acre spacing. Forty-acre spacing results in 16 wells per 640 acre section with wells being located 1,320 feet apart. In this pattern of development, several oil wells would produce into central tank batteries through pipelines. Gas wells are usually drilled on 640-acre spacing, but poor drainage characteristics or other considerations may result in an increased density of 320 or 160-acre spacing. Gas wells drilled on 160-acre spacing would result in 4 wells per section. These development scenarios would each require multiple roads and pipelines. Therefore, cumulative land use requirements associated with the above described actions are difficult to quantify. All estimates of cumulative impacts in Table 4-3 are based upon an average of 20 Federal wells drilled per year extrapolated over the life of the plan to

the year 2016. The estimates of cumulative surface disturbance following rehabilitation or revegetation occurring after the first year are presented on Table 4-4.

TABLE 4-3
ESTIMATED CUMULATIVE
SHORT-TERM SURFACE
DISTURBANCE CAUSED BY FEDERAL
OIL AND GAS ACTIVITY IN TEXAS
BY ALTERNATIVE THROUGH THE
YEAR 2016

ALTERNATIVE	TOTAL # WELLS	AVG. PAD ACRES	AVG. ROAD ACRES	TOTAL ACRES DISTURBED
Alt. A Continuation of Present Management	400	1,360	900	2,260
Alt. B Intensive Surface Management	400	1,360	900	2,260
Alt. C No Leasing	200	680	450	1,130

(Source: BLM)

TABLE 4-4
ESTIMATED CUMULATIVE SURFACE
DISTURBANCE CAUSED BY FEDERAL
OIL AND GAS ACTIVITY IN TEXAS BY
ALTERNATIVE FOLLOWING
REHABILITATION THROUGH THE
YEAR 2016

ALTERNATIVE	TOTAL # WELLS	AVG. PAD ACRES	AVG. ROAD ACRES	TOTAL ACRES DISTURBED
Alt. A Continuation of Present Management	400	200	900	1,100
Alt. B Intensive Surface Management	400	200	900	1,100
Alt. C No Leasing	200	100	450	550

(Source: BLM)

Based upon the projections of total oil and gas development, the total acreage disturbed by all oil and gas activities in Texas will average 29,154 acres annually. The small amount of total surface disturbance attributed to Federal oil and gas development is due to the small number of Federal wells expected to be drilled (less than 0.5 percent of the total wells drilled in Texas each year) and the fact that many Federal mineral tracts are leased for pooling purposes only and are never drilled.

CONTINUING MANAGEMENT GUIDANCE (CMG)

Alternative A is the application of CMG. The application of leasing and development guidelines and policy to each tract of Federal mineral estate is displayed in Chapter 2, as well as site specific application of alternatives. CMG would be applicable to all alternatives and reflected in the analysis of the impacts of the alternatives on the affected environmental components.

ENVIRONMENTAL COMPONENTS

The environmental components are those that could be impacted by implementation of one or more of the alternatives.

The environmental concerns or components that are known to be affected by oil and gas development include air quality, water, soils, vegetation, wildlife, cultural resources, paleontological resources, minerals and social and economic conditions.

IMPACTS OF ALTERNATIVE A,
CONTINUATION OF PRESENT
MANAGEMENT (NO ACTION) AND
ALTERNATIVE B. INTENSIVE SURFACE
PROTECTION (PREFERRED
ALTERNATIVE)

Under Alternative A and B, approximately 20 Federal oil and gas wells would be drilled per year in Texas.

1. Air Quality

Impacts to air quality will typically be minor, short-term and very localized. Road and pad development would result in small amounts of fugitive dust production, vehicle exhaust emissions and associated release of carbon monoxide.

Impacts to air quality will be reduced at the project stage by development of site specific COA for an APD or other action. These site specific requirements could range from watering access roads, to keep particulates low, to required flaring of hazardous gases.

2. Water Resources

Activities associated with oil and gas development could have adverse impacts on surface and subsurface waters.

Surface Waters

Detrimental impacts could occur to surface waters such as lakes and perennial streams from increased soil erosion resulting from pad and road development within watersheds. Increased sediment and salinity loads in streams and sedimentation of reservoirs leads to lowered productivity and loss of fisheries habitats.

Waste fluids associated with oil and gas operations would present another potentially adverse impact to surface waters. Reserve pit and/or produced waters could migrate from unlined pits into nearby surface waters, possibly degrading water quality. Reserve pit fluids may contain small amounts of toxic elements used in drilling mud, such as chromium (hexavalent) and other heavy metals. Drilling and completion fluids may have high salt concentrations. Produced waters may also contain high concentrations of salts (particularly sodium and chloride) and heavy metals.

COA for APDs within Texas have been developed to reduce impacts to surface waters. Operators are required to construct pits from clay to reduce migration, line pits with an impervious membrane or use a closed drilling system. Also, erosion control measures such as the strategic placement of hay bales, silt fences, etc. may be required.

Subsurface Waters

Oil and gas operators are required to protect freshwater zones by the placement of casing, cement, packers and/or other downhole devices. Improper or inadequate placement could result in adverse impacts to fresh water aquifers.

3. Soils

Oil and gas development will have a direct adverse impact on soils physically disturbed. This impact would be limited to the areas where the vegetation is removed, destroyed or damaged by vehicular traffic. The impacts would be of two types: (1) physical removal, mixing, or burying of the surface soils or (2) damage or destruction of soil properties in place.

The first impact would be caused by site preparation for well pads, related structures, roads, erosion and slope failures. This would destroy the soil texture, mix the soil horizons, and cause a short-term reduction in the potential productivity of the soils.

Revegetation of these disturbed areas would initiate the process of creating new soil structure and soil horizons. The revegetation rate would vary depending on soil moisture, rainfall and time of year. The initial soil productivity would be influenced by organic matter incorporated into the soil by the rehabilitation method used. Soil productivity should not be significantly different from undisturbed areas following rehabilitation.

Soil compaction, the second impact, would be caused by vehicle or machinery operation. Wide variations in the amount of compaction would be expected due to the wide weight ranges of different equipment. Soil compaction would decrease water and air infiltration into the soil profile and thus, reduce soil productivity. Where soil compaction is severe, soil vegetation productivity would be virtually eliminated in the short-term without mechanical treatment to reduce compaction.

A COA utilized to reduce impacts to soils is to require the operator to stockpile the topsoil for later use in rehabilitation. The small amount of soil disturbance anticipated from developing 20 wells (113 acres) on Federal leases in a given year or cumulatively for 400 wells (2,260 acres) for the life of the RMP, would result in no measurable effect on total vegetative productivity within a particular soil or vegetative type.

4. Vegetation

Construction of access roads, pipelines and drill pads would result in the loss of

approximately 5.65 acres of vegetation per well site. With proper reclamation following drilling, this loss of vegetation would be short-term, assuming that reclamation success would take approximately two years for native grasses or one year for crops.

Although as much as 2.9 acres of the 3.4 acre drill pad may be reclaimed at the time of developing a well site, additional road widening to accommodate a pipeline or power line could offset this reclamation success. Approximately 113 acres of vegetation could be expected to be disturbed annually due to Federal oil and gas lease development under Alternative A and B. Cumulative vegetation disturbed regardless of rehabilitation success would be approximately 2,260 acres under these alternatives.

Impacts to riparian and wetland vegetation would be minimized. Under Alternatives A and B, no oil and gas development would be allowed to result in a net loss of these vegetation types. Pursuant to 43 CFR 3101.1-1, proposed operations can be relocated up to 200 meters in the absence of a stipulation. Under Alternatives A and B, stipulation ORA-2 could result in relocation of proposed operations in excess of 200 meters.

E.O. 11990 and the BLM's policies regarding wetland and riparian area management and protection, govern the types of surface disturbing activities permitted in these high value resource areas.

To comply with the requirements of the ESA, proposed oil and gas surface disturbance sites would be evaluated and then inventoried, if necessary, for SSS occurrence at the operational stage. This would ensure that sites having the potential for special status plant species would be inventoried and well locations changed to avoid any discovered species.

5. Wildlife

Oil and gas leasing and subsequent development impacts wildlife both directly and indirectly. Direct impacts consist of actions that result in immediate mortality to an individual or several members of a group, such as collision with vehicles and soil compaction by machinery. Indirect impacts include actions that affect animal behavior or habitat quality or quantity.

The direct loss of habitat as a result of surface disturbance of approximately 2,260 acres due to Federal oil and gas leasing over the next 20 years would not be a significant impact to the wildlife of the state of Texas. If oil and gas activities were concentrated in a small area over an extended period, detectable impacts may occur. The major concern would be the impact of human activity associated with the surface disturbance. The severity of impacts would depend on factors such as time of year, duration of activity, and sensitivity of species involved.

Oil and gas extraction may have an additional impact upon wildlife populations causing a particular species or population to expend more energy due to disruptions in seasonal activity patterns, habitat avoidance due to surface activities or flight to escape. These effects are more significant during critical seasons when the animals are already under stress.

No significant impact to general wildlife populations is anticipated under Alternative A after application of appropriate mitigating measures.

Impacts to wildlife under Alternative B would be less than those described for Alternative A. Under Alternative B, additional, optional stipulations (ORA-3 and ORA-4) would be included to provide both species and habitat

protection. The impact to seasonal wildlife use areas caused by human presence would be mitigated under Alternative B by application of ORA-3. For example, a season of use stipulation, ORA-3, would protect wintering waterfowl from disturbance in areas adjacent to wetlands.

6. Special Status Species (SSS)

The protection of SSS is a requirement of operating on a Federal oil and gas lease.

To comply with the requirements of the ESA, most oil and gas pre-leasing actions for Federal split-estate minerals in Texas and all proposed surface disturbance sites (APDs, Sundry Notices, etc.) would be evaluated for SSS occurrence at the time that a nomination for lease or operational application is received.

This ensures that each site having the potential for special status plant and animal species would be evaluated, inventoried if necessary and proposed projects modified to avoid impacts to SSS.

The BLM will evaluate each lease nomination of split-estate lands using information provided by the applicant. The decision to enter into agency coordination with the TPWD and the FWS for these proposed lease areas will be made on a case by case basis. Agency coordination would be initiated should the proposed lease area warrant evaluation beyond review of maps (and other available information) and application of the lease stipulations and notices presented in this RMP.

The BLM, at the APD (operational, post-lease) stage, will write the TPWD and the FWS for their regulatory involvement comments regarding SSS, wetlands and other significant wildlife resources they may be aware of in the vicinity of the site specific project. These two

agencies provide their analyses of the likelihood of SSS or other important wildlife resources occurring in the vicinity of the project and their recommendations whether site specific SSS surveys are necessary. The operator/applicant is responsible for hiring a qualified biologist/botanist to be acknowledged by the TPWD and the FWS. The operator/applicant is also responsible for completion of the surveys and subsequent reports in a manner acceptable to BLM, TPWD and the FWS.

In the absence of pre-leasing SSS information and T&E lease notices, the information and recommendations received through post-leasing agency coordination can be imposed on the applicant through Section 6 of the BLM Lease Terms. These terms appear on the back of every BLM oil and gas lease (Offer to Lease and Lease for Oil and Gas, Form 3100-11). Pursuant to Section 6 of these lease terms the company submitting the APD can be required to perform studies and/or surveys for SSS. The need for, and results of, such surveys are coordinated with the above mentioned agencies and culminates in imposing the necessary requirements to comply with the ESA and state of Texas endangered species laws.

Accidental deaths of bats and migratory birds at BLM approved oil and gas facilities will be minimized by the use of COAs and general requirements designed to modify, equip or construct facilities in such a manner as to protect these SSS resources. These measures have been discussed in Chapter Two of this document.

Impacts to SSS or other species of wildlife will not be significant due to the measures discussed above and the relatively small number of total acres (2,260 acres) to be disturbed over 20 years of Federal oil and gas lease development.

Alternatives A and B are not likely to adversely affect Federal or state listed T&E plant or animal species, designated critical habitat, species proposed for listing, category one or two species under review by the FWS or any other SSS.

7. Cultural Resources

There are both positive and adverse cumulative impacts upon cultural resources under Alternatives A and B. Development of Federal oil and gas resources would mean that more areas would have undergone Class III survey inventory. This would provide more information related to past human activities in the planning area.

The cultural resources that could be impacted by oil and gas development are protected by a group of Federal laws, particularly Section 106 of the National Historic Preservation Act as amended (NHPA). Procedures and responsibilities in this law are based on the earlier preservation laws, the NHPA as amended, E.O. 11593, the Archeological and Historic Preservation Act of 1974, FLPMA, the American Indian Religious Freedom Act of 1978, the Archeological Resources Protection Act of 1979 and Native American Grave Protection and Repatriation Act of 1990. Policy and management for Texas cultural resources are drawn from these laws using BLM's 8100 manual for cultural resources. Cultural resources are also protected by NEPA.

A majority of the workload in cultural resources involves compliance with Section 106 of the NHPA. Section 106 requires the BLM to take into account the effects of oil and gas development on all cultural resources. The BLM's policy is to avoid impacts to significant cultural resources, but if impacts cannot be avoided, then mitigation may be required before approval of the undertaking. When it is

determined that oil and gas development will have an effect on cultural resources, consultation is initiated with the SHPO or the Advisory Council on Historic Preservation to resolve the matter on a case by case basis.

8. Paleontology

Oil and gas development in Texas could disturb surface exposure of geologic formations bearing fossils or trackways. Many Texas counties have produced fossil material, particularly Somervell, and Brewster Counties. The disturbance would be in the form of a direct impact, such as drill pad excavation or from pipeline and road building. In most well impacts within Texas, preservation of individual outcrops is unimportant, either because of lack of significance or the absence of fossil material.

Under Alternatives A and B, there would be no significant impact to the paleontological resources of Texas after application of the appropriate mitigation measures.

9. Minerals

Federal oil and gas leasing and development would occur under Alternatives A and B.

Under Alternatives A and B, approximately 20 wells per year will be drilled on Federal oil and gas leases.

The low amount of Federal oil and gas activity that results from the Federal mineral estate would not be a significant impact on the states mineral resources, however, the extraction of Federal oil and gas could be termed significant on a local level. Extraction of oil and gas would result in an irreversible and irretrievable loss of the resources.

10. Social And Economic

Projected oil and gas development indicates that regardless of which Federal oil and gas leasing alternative is selected as the RMP, approximately 103,200 oil and gas wells will be drilled in the state over the next 20 years.

Under Alternatives A and B, approximately 400 Federal oil and gas wells would be drilled in the same period. The relative small percentage of Federal oil and gas activity results in insignificant impacts to the economy and social structure of the state of Texas. However, the economic and social structure of individual small communities could be expected to be impacted by local operations on Federal minerals. Overall, Federal oil and gas leasing and development within the RMP area would not have a significant impact on state-wide oil and gas based economics under Alternatives A and B.

Impacts to the states' social and economic structure under these alternatives would be the same, except that lease development under Alternative B could be more costly to operators due to restrictions on the location and timing of operations. Bonus bids could also be less and therefore, less revenue would be generated to the Federal government.

IMPACTS OF ALTERNATIVE C, NO LEASING

Under Alternative C, approximately 10 Federal oil and gas wells would be drilled per year in Texas. These wells would be drilled on existing leases.

1. Air Quality

Impacts to air quality under Alternative C would be approximately half the described impacts for Alternatives A and B.

2. Water Resources

Impacts to both surface and subsurface waters under Alternative C would be approximately half those described for Alternatives A and B.

3. Soils

Impacts to soils under Alternative C would be approximately half the described impacts for Alternatives A and B.

4. Vegetation

Impacts to vegetation under Alternative C would be approximately half those described for Alternatives A and B.

5. Wildlife

Impacts to wildlife under Alternative C would be approximately half those described for Alternatives A and B. None of the additional stipulations or lease notices applicable to Alternative B would apply to leased tracts.

6. Special Status Species

Impacts to SSS under Alternative C would be the same as described for Alternatives A and B. The protection of SSS is a requirement of operating on a Federal oil and gas lease.

7. Cultural Resources

Impacts to cultural resources under Alternative C would be approximately half those described for Alternatives A and B.

8. Paleontology

Impacts to paleontological resources under Alternative C would be approximately half those described for Alternatives A and B.

9. Minerals

Impacts to mineral resources under Alternative C would be approximately half those described for Alternatives A and B. No additional Federal oil and gas would be leased, but existing leases would continue to be developed.

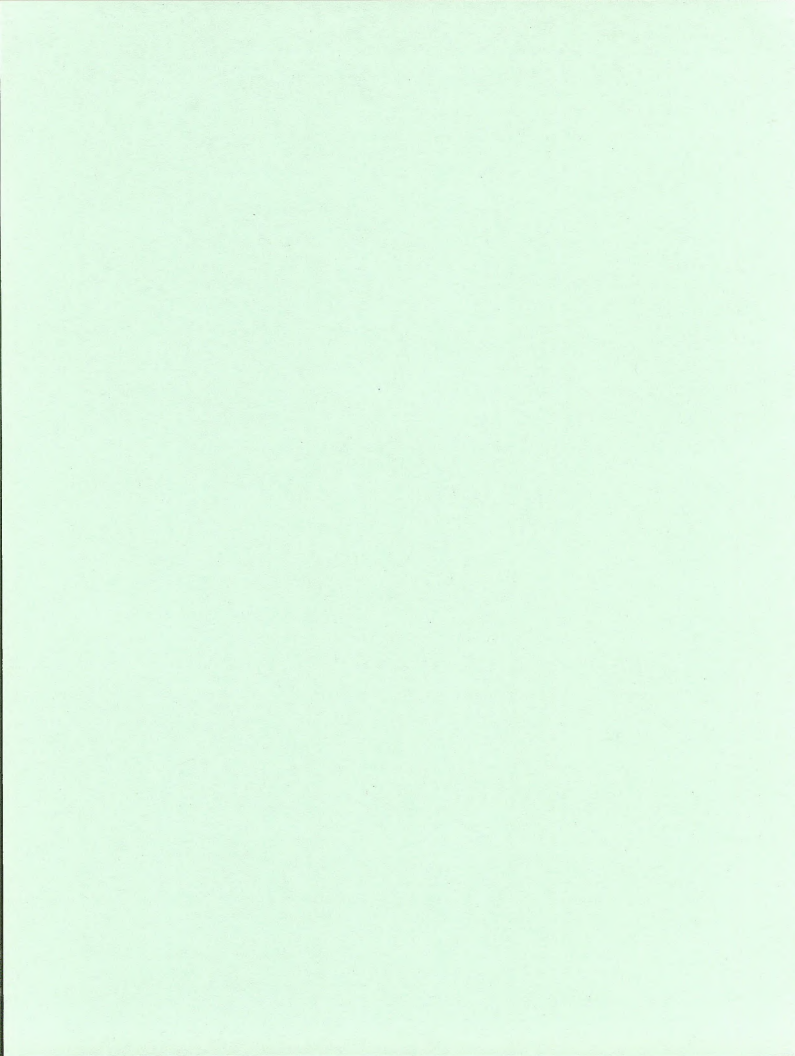
10. Social and Economic

Impacts to the states social and economic structure under Alternative C would be approximately half those described for Alternatives A and B, except that Alternative C would result in a loss of Federal lease revenues to the state and Federal governments from lease sale bonus bids, lease rentals and fees, royalties and taxes.

CHAPTER FIVE

CONSULTATION AND COORDINATION





CHAPTER FIVE CONSULTATION AND COORDINATION

INTRODUCTION

This chapter summarizes the consultation and coordination conducted in preparation of the Draft Texas RMP/EIS. During preparation of this document, both formal and informal efforts have been made to involve the public, other Federal agencies, state agencies and local governments in the planning process. Several points of public involvement are mandated by regulations and were complied with.

Prior to the preparation of this document, the process of data collection and other preliminary activities occurred. This process included inventory, public participation, interagency coordination and preparation of a MSA. The MSA, as well as documentation of consultation and coordination efforts, are on file in the BLM office. Consultation and coordination with other Federal agencies, state agencies, organizations and individuals occurred in a variety of ways throughout the planning process. SSS information was requested from the FWS and TPWD by correspondence dated October 25, 1994. Lists of SSS from these agencies appear in Appendix 4. The FWS and the TPWD realize the statewide scope of this RMP/EIS effort and are familiar with the site specific project review process currently in use.

The BLM will continue ESA consultation and coordination for the Texas RMP/EIS by issuing an "Evaluation of Special Status Species, Wetlands and Riparian Zones" report which will contain BLM's "No-Effect" determination. This evaluation will use the Draft RMP/EIS as documentation and these two documents together will serve as BLM's Biological Assessment. The FWS and the TPWD will be asked to review, comment and concur with BLM's "No-Effect" determination. BLM's

"No-Effect" determination is predicated upon the use of leasing stipulations, lease notices, site specific impact analysis and wildlife agency coordination prior to site specific Federal actions. These measures are developed and discussed throughout this document.

The Texas RMP/EIS was prepared by an interdisciplinary team of resource specialists from the Tulsa District. Table 5-1 lists the names and qualifications of each team member.

CONSISTENCY WITH OTHER PLANS

The BLM planning regulations require that RMPs be "consistent with officially approved or adopted resource-related plans and the policies and procedures contained therein, of other Federal agencies, state and local governments and Indian tribes, so long as the guidance and RMPs are also consistent with the purposes, policies and programs of Federal laws and regulations applicable to public lands ..." (43 CFR 1610.3-2). In order to ensure consistency, finalized resource management plans were solicited from all Federal, state and local agencies involved and/or cooperating in the development of this plan.

PUBLIC PARTICIPATION

Public involvement in the preparation of a land use plan is a dynamic process occurring throughout the development and implementation of an RMP. In addition to the formal public participation steps, informal contacts occur frequently with Federal oil and gas operators, lessees and other interested persons and groups through meetings, telephone calls and/or letters. All applicable

public participation is documented throughout the planning process. Public participatory input for the Texas RMP/EIS was solicited through the following methods:

1. A "Notice of Intent" to conduct land use planning, call for coal, other mineral, and resource information and an announcement of dates, locations and times of the public meetings/open houses provided to receive oral comments was published on August 24, 1992, in the Federal Register, 57 FR 38324.

2. A news release announcing initiation of the land use planning effort and repeating the information contained in the Federal Register notice was sent on August 26, 1992, to the approximately 350 groups, individuals, corporations and agencies contained on the Texas RMP/EIS mailing list.

3. A duplicate News Release of the one sent to the Mailing List, was sent to 107 newspapers throughout the state on August 24, 1992.

4. Public meetings/open houses were held in Texas at: Austin, September 24, Amarillo, September 28, Midland, September 29, Arlington, October 13, Houston, October 14, and Corpus Christi, October 15, 1992. These meetings were a means to provide the public the opportunity to provide comments and identify potential issues orally.

Copies of the Federal Register notices, news releases, the RMP/EIS mailing list and the list of the newspapers receiving copies of the news releases are available for review, during the hours of 8:00 a.m. to 3:00 p.m., at the BLM office in Moore, Oklahoma.

PUBLIC REVIEW OF THE DRAFT RMP/EIS

Table 5-2 is a partial listing of various Federal, state and local agencies, organizations, groups and individuals to which the Draft RMP/EIS is being sent for review and comment.

TABLE 5-1
LIST OF PREPARERS

NAME/ RMP RESPONSIBILITY	EDUCATION/EXPERIENCE
Brian Mills Team Leader	B.S., Wildlife Ecology, Oklahoma State University. BLM 21 years (Wildlife Biologist, 11 years, Natural Resource Specialist, 2 years, and Planning Team Leader, 8 years). Experience with DOD and the private sector (Amoco Production Inc., Research Division) prior to BLM service.
Phil Keasling Wildlife, Vegetation	B.S., Zoology, Oklahoma State University. BLM 18 years as a Wildlife Biologist. Experience with both Oklahoma State University and the University of Wisconsin, Madison, prior to BLM service.
John Ledbetter Writer/Editor, Lands & Realty	B.S., Industrial Arts Educ., Southwestern Oklahoma State University. BLM 11 years (Realty Specialist, 7 years, Petroleum Engineering Technician, 4 years). Experience with DOD and private sector (Dresser Magcobar) prior to BLM service.
John Northcutt Cultural Resources, Paleontology	B.A., English and Educ., Phillips University; M.A., Anthropology, Oklahoma University; A.A.S., Data Processing, Cameron University. BLM 7 years as an Archeologist. Experience as a contract Archeologist 15 years (7 years with the Museum of the Great Plains).
Bob Prickett Environmental Protection Specialist	B.S., Asian Studies; M.A., Recreation/Public Administration, University of Oklahoma. BLM 19 years (Outdoor Recreation Planner, 12 years, Technical Information Specialist, 4 years, Environmental Protection Specialist, 3 years).
Keith Tyler Environmental Protection Specialist	B.S., Biology/Fisheries Biology, Colorado State University. Post-graduate studies, Hazardous Materials Manager certification/MS degree. BLM 13 years (Hazardous Materials Coordinator, 6 years, Petroleum Engineering Technician, 6 years, Fisheries Biologist, 1 year). Experience with private sector (Global Fluids, Mud Logging Engineer).
Catherine Wolff-White Environmental Protection Specialist	B.S., Geography/Cartography and Remote Sensing, Pennsylvania State University. BLM 11 years (Cartographic Technician, 2 years, Geographer, 6 years, Environmental Protection Specialist, 3 years).

TABLE 5-2
LISTING OF DOCUMENT RECIPIENTS

U.S. SENATORS

Phil Gramm
Kay Bailey Hutchison

U.S. REPRESENTATIVES

W R (Bill) Archer
Richard Arney
Joe Barton
Ken Bentsen
Henry Bonilla
John Bryant
Jim Chapman
Ronald Coleman
Larry Combest
E (Kika) De La Garza
Tom Delay
Lloyd Doggett
Chet Edwards
Jack Fields
Martin Frost
Pete Geren
Henry B Gonzalez
Gene Green
Ralph Hall
Eddie Bernice Johnson
Sam Johnson
Greg Laughlin
Sheila Jackson Lee
Solomon P Ortiz
Lamar Smith
Charles Stenholm
Steve Stockman
Frank Tejeda
William Thornberry
Charles Wilson

TEXAS STATE SENATORS

Ken Armbrister
Gonzalo Barrientos
Teel Bivins
James E "Buster" Brown
David Cain
Rodney Ellis
Mario Gallegos

Michael Galloway
Chris Harris
Tom Haywood
Don Henderson
John Leedom
Eddie Lucio
Gregory Luna
Frank Madla
Mike Moncrief
John Montford
Jane Nelson
Drew Nixon
Jerry Patterson
Bill Radloff
Peggy Rosson
Florence Shapiro
David Sibley
Bill Sims
Carlos Truan
Jim Turner
Royce West
Jeff Wentworth
John Whitmire
Judith Zaffirini

TEXAS STATE REPRESENTATIVES

All house members

FEDERAL GOVERNMENT

Department of Agriculture
Agricultural Research Service
U. S. Forest Service
Soil Conservation Service
Department of Defense
U. S. Air Force
U. S. Army
Corps of Engineers
U. S. Navy
Department of Energy
Department of the Interior
Bureau of Indian Affairs
Bureau of Mines
Bureau of Reclamation
U. S. Fish & Wildlife Service
National Park Service
Office of Environmental Affairs

Office of Surface Mining
 Department of Transportation
 Federal Aviation Administration
 Environmental Protection Agency
 International Boundary and Water Commission

San Antonio River Authority
 San Jacinto River Authority
 Tigua Tribe (Pueblo Isleta)
 Trinity River Authority of Texas

STATE GOVERNMENT

Governor of Texas
 Commissioner of Agriculture
 Conservation Foundation
 Department of Commerce
 Department of Health
 Department of Highways and Public Transportation
 General Land Office
 Historical Commission
 Legislative Reference Library
 Library and Archives Commission
 Office of State-Federal Relations
 Office of the Attorney General
 Parks and Wildlife Department
 Public Utilities Commission
 Railroad Commission
 Texas Federal Rural Development Council
 Texas State Forester
 Water Commission

CITY, COUNTY & TRIBAL ORGANIZATION/GOVERNMENT

Alabama Coushatta Tribal Office
 Angelina and Neches River Authority
 Bastrop County Soil and Water Conservation District
 Caddo Lake Compact Commission
 City of Austin
 City of Bastrop
 City of San Antonio
 Bandera County River Authority
 Brazos River Authority
 Canadian River Municipal Water Authority
 Concho River Water and Soil Conservation Authority
 Guadalupe River Authority Upper
 Guadalupe-Blanco River Authority
 Lavaca-Navidad River Authority
 Lower Colorado River Authority
 Neches Valley Authority Lower
 Pecos River Compact Commission
 Red River Authority Board
 Runnels County Water Authority
 Sabine River Authority

INDUSTRY, UNIVERSITIES & SPECIAL INTEREST GROUPS

Abilene Christian University
 Adams Resources Exploration Corp
 Amoco Production Company
 Anadarko Petroleum Corporation
 Arco Oil and Gas Company
 Bastrop Advertiser
 Bastrop County News
 Bastrop ISD
 Baylor University
 Beard Oil Company
 Bechtel Environmental INC
 Bird Rescue
 Black Stone Oil Company
 Central Texas Lignite Watch
 Champion International Timber Company
 Coastal Oil and Gas Corporation
 Davis Mountains Land Commission
 Dekalb Energy Company
 East Texas State University
 Environmental Management Associates
 Espey Huston and Associates Inc
 Exxon/Arco Exploration Company
 Exxon USA
 Frontera Audubon
 GEO-Marine Inc
 Grace Petroleum Corporation
 Grant Tensor Geophysical Corp.
 Greenbriar ISD
 Hall Southwest Water Consultants Inc
 Horizon Environmental Services
 Houston Audubon Society
 International Association of Geophysical Contractors
 Lotus Home Birthing Inc
 Louis Dreyfus Natural Gas Corp
 Maersk Energy Inc
 McFarlane and Associates Environmental Consultants
 Midwestern State University
 Mina Land Company
 Mitchel Energy Corp
 Mobil Exploration and Production US Inc
 Morrison Knudsen Company
 Murphy Operating Company
 Murray State College

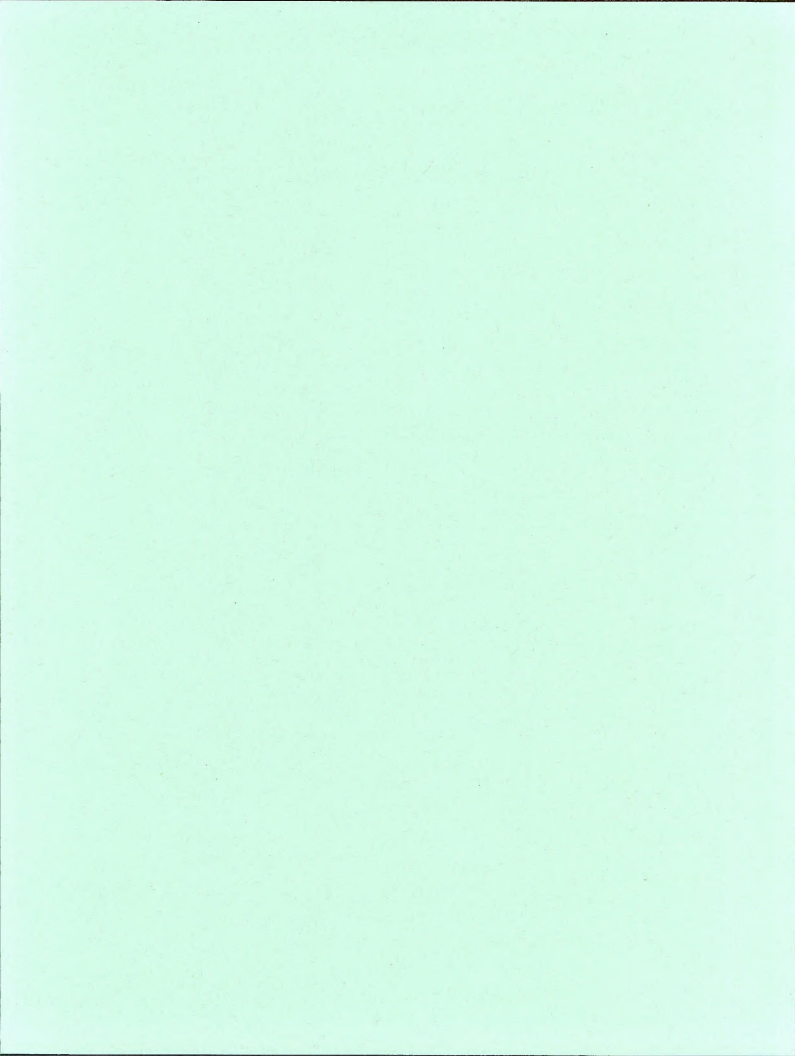
National Audubon Society
National Wildlife Federation
Native Plant Project
North American Consultants Inc
North Texas State University
Pasha Publications
Phillips Petroleum
Sanchez-O'Brien Oil and Gas Corp
Shell Oil Company
Sierra Club—Austin

Sierra Club—Houston
Southern Opera Workshops Inc
Stephen F Austin University
Temple-Inland Forest Products Corp
Texas A & M University
Texas Tech University
The Bastrop County Times
Union Pacific Resources Company
University of Texas
Western Geophysical

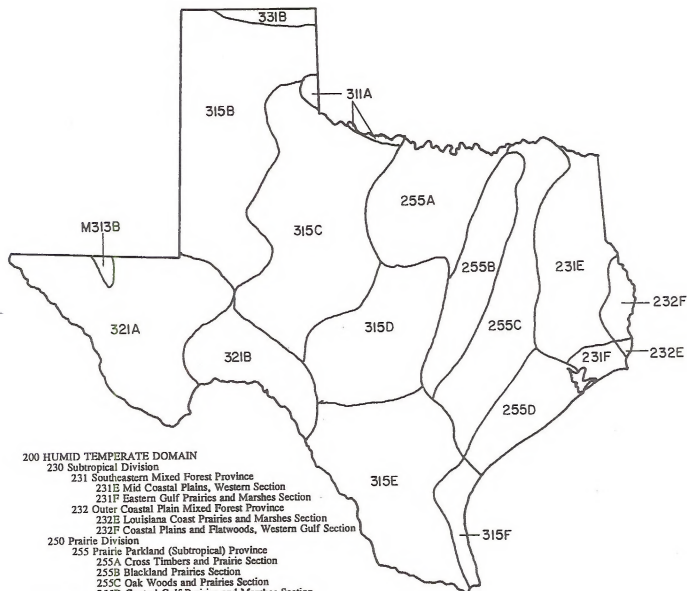
APPENDIX 1

ECOLOGICAL SUBREGIONS OF TEXAS: SECTION DESCRIPTIONS

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ECOREGIONS OF TEXAS



200 HUMID TEMPERATE DOMAIN

230 Subtropical Division

231 Southeastern Mixed Forest Province

231B Mid Coastal Plains, Western Section

231F Eastern Gulf Prairies and Marshes Section

232 Outer Coastal Plain Mixed Forest Province

232B Louisiana Coast Prairies and Marshes Section

232F Coastal Plains and Flatwoods, Western Gulf Section

250 Prairie Division

255 Prairie Parkland (Subtropical) Province

255A Cross Timbers and Prairie Section

255B Blackland Prairies Section

255C Oak Woods and Prairies Section

255D Central Gulf Prairies and Marshes Section

300 DRY DOMAIN

310 Tropical/Subtropical Steppe Division

311 Great Plains Steppe and Shrub Province

311A Redbed Plains Section

315 Southwest Plateau and Plains Dry Steppe and Shrub Province

315B Texas High Plains Section

315C Rolling Plains Section

315D Edwards Plateau Section

315E Rio Grande Plain Section

315F Southern Gulf Prairies and Marshes Section

M310 Tropical/Subtropical Regime Mountains

M313 Arizona-New Mexico Mountains Semi-Desert - Open Woodland - Coniferous Forest - Alpine Meadow Province

M313B Sacramento-Monzano Mountain Section

320 Tropical/Subtropical Desert Division

321 Chihuahuan Semi-Desert Province

321A Basin and Range Section

321B Stockton Plateau Section

330 Temperate Steppe Division

331 Great Plains-Palouse Dry Steppe Province

331B Southern High Plains Section

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Ecological Subregions of the United States: Section Descriptions

WO-WSA-5

Compiled by W. Henry McNab and Peter E. Avers

Prepared in cooperation with
Regional Compilers and the
ECOMAP Team of the Forest Service

July 1994

This document contains the biophysical descriptions of the Sections as depicted on the map "Ecoregions and Subregions of the United States," dated June 1994. The basis for the map and this document is the National Hierarchical Framework of Ecological Units (ECOMAP 1993). This framework provides a standardized method for classifying, mapping, and describing ecological units at various geographic planning and analysis scales.

This text, which supplements the map by describing the delineated Section ecological units, is the product of collaboration and teamwork by compilers from all Forest Service Regions, other Forest Service administrative units, States, and individuals. Because this document presents information on a wide range of environmental, biological, and cultural characteristics of ecosystems at the subregion scale, many compilers were involved in its development. Each compiler drew upon personal knowledge of environmental relationships and mapping principles and obtained help from other resource specialists to develop these map unit descriptions.

This text should be viewed as a continually evolving and refined draft of our ability to recognize and describe ecosystems at the subregion scale. Because this is the first edition and it was prepared by many persons in a short time, this text undoubtedly contains errors and perhaps omits pertinent information. Also, because our current knowledge of ecosystems is limited, new relationships will be discovered continually. The Forest Service is committed to management based on ecological principles and intends to update the subregion map and this text as required. Users should report errors in this document and new knowledge applicable at the Section level in the national hierarchy to the Forest Service Region primarily responsible for its compilation. Addresses of Regional contacts are listed in Appendix E. Comments and suggestions about this document as a whole should be directed to the Chief, USDA Forest Service, Box 96090, Washington, DC. 20090-6090, ATTN: Ecosystem Management.

Acknowledgments

The development and completion of this national document in a relatively short time period is a direct result of the coordination, persistent efforts, and diligent teamwork of many persons. Principal compilers were responsible for map unit delineations, developed the overall framework of the Section map unit descriptions, compiled map unit descriptions, and guided overall coordination and completion of tasks associated with this text in their Regions. Assistant compilers aided

some principal compilers by locating and organizing resource information pertaining to broad geographical areas, synthesizing general information into succinct summaries, and reviewing map unit descriptions for accuracy. Other assistant compilers made contributions such as developing specific elements of the map unit descriptions or providing technical knowledge and support. Associate compilers participated by serving as subject-matter experts, summarizing information for specific geographical areas, reviewing descriptions for accuracy, and performing other tasks that contributed to the production of this text. Other individuals undoubtedly contributed to this document, but, unfortunately, will remain unknown. This text was produced through the collective, diligent efforts of the following individuals.

Principal Compilers:

Alaska Region	Terry Brock
Eastern Region	Walter E. Russell
Intermountain Region	Thomas M. Collins
Northern Region	John Nesser
Pacific Northwest Region	Robert T. Mearns
Pacific Southwest Region	Charles B. Goudey
Rocky Mountain Region	Jerry Freecouf
Southern Region	James E. Keys, Jr.
Southwestern Region	Wayne Robbie
Southeastern Forest Experiment Station	W. Henry McNab
Washington Office	Peter E. Avers

Assistant Compilers:

Alaska Region	Greg Nowacki
Eastern Region	Andy Rorick
Intermountain Region	John Lott
Northeastern Area State and Private Forestry	Constance Carpenter
Northeastern Forest Experiment Station	Marie-Louise Smith
Northern Region	Jim Sheldon
Pacific Northwest Region	J. Bailey
Pacific Northwest Region	J. Keyser
Pacific Northwest Region	D. Lammers
Pacific Northwest Region	R. Pedersen
Southern Region	Marilyn J. Robertson
Southwestern Region	Mike Linden
Southwestern Region	R. Steinke
Washington Office	Robert G. Bailey
Washington Office	James Fenwood
Washington Office	Thomas King
Washington Office	Greg Super

Associate Compilers:

Forest Service Compilers:

Alaska Region. R. Dipold, L. Suring.

Eastern Region. B. Acciavatti, J. Ball, S. Behling, R. Berrisford, A. Boss, R. Brinker, R. Brooks, M. Bruhy, S. Chandler, A. Cramer, D. Dagnan, T. DeMeo, D. Duffield, J. Edde, R. Ewing, K. Flegel, S. Forney, C. Grove, M. Herth, D. Hoppe, L. Houston, D. Hurst, J. Jordan, L. Kempf, A. Krieger, D. Lacey, J. Lanier, H. Lesser, B. Leuelling, A. Levasseur, H. Mahoney, L. Martin, J. Mathisen, M. McCorvie, T. McLellan, P. Merchant, W. Moriarity, R. Moss, C. Nowak, E. Padley, L. Parker, H. Pawelczyk, G. Peters, C. Price, R. Rabideaux, L. Richards, K. Roenke, J. Scott, M. Spanel, K. Sykes, L. Tracy, J. Wargo, J. Wettstaed, L. Wright, M. Yamasaki.

Intermountain Region. A. Agnew, J. Arnold, F. Bartlett, J. Bayer, T. Bowerman, C. Butler, R. Campbell, R. Davis, D. Fallon, S. Feltis, P. Flood, S. Goodrich, F. Gordon, G. Jackson, D. Johnson, R. Jorgensen, D. Larsen, R. Leiby, B. Lowry, T. Mark, D. Monte, D. Nelson, B. Noblitt, M. Orme, W. Padgett, K. Paulin, R. Player, K. Ramsey, D. Reeder, R. Rodriguez, M. Schwalbach, M. Smith, T. Svalberg, D. Tart, R. Thompson, L. Welch, C. Williams, R. Williams, A. Winward, D. Zamudio.

Northern Region. S. Jacobson, T. Laysen.

Pacific Northwest Region. J. Bailey, D. Lammers, J. Keyser, R. Pedersen, B. Smith.

Pacific Southwest Region. D. Diaz, J. Chatoian, S. Frankel, K. Friday, S. Husari, J. Kliejaus, S. Miles, J. Neisess, L. Newell, J. Rose.

Rocky Mountain Region. R. Dersch, S. Franklin, M. Holm, T. Sullivan, D. Wheeler, M. Zimmerman.

Southern Region. V. Bishop, T. Collins, N. Covington, S. Croy, R. Evans, J. Herrig, S. Hooks, J. MacGregor, S. McCorquodale, K. McLaughlin, J. Novasat, B. Pell, W. Pistrang, T. Raml, A. Rorick (Eastern Region), R. Rightmyer, S. Simon, K. Stoneking, C. Williams, A. Williamson.

Southwestern Region. T. Cartledge, P. Gadd, J. Hanson, D. Johnson, J. McDonald, P. Pilles, J. Propper, S. Wood, J.N. Young.

State and Private Forestry:

Northeastern Area State and Private Forestry. K. Sykes.

Other Contributors:

Bryan Hargrave - Minnesota Department of Natural Resources.

Max Hutchinson - Illinois Chapter, The Nature Conservancy.

Timothy A. Nigh - Missouri Department of Conservation.

Glendon W. Smalley - retired, USDA Forest Service, Southern Forest Experiment Station.

Photograph Credits:

Many photographers also made important contributions to this document by providing pictures that illustrate the physical, biological, and cultural characteristics of the subregion ecological map units. Unless otherwise noted, photographers are employees of the USDA Forest Service. When the photograph was obtained from Forest Service files and the photographer is unknown, the person providing the photograph is noted. Credits for photographs are arranged by Region and Section.

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Eastern Region. 212A - Don Collins, USDA Soil Conservation Service; 212B - L. Safford; 212C - M. Torsello; 212D - Richard Hallett, University of New Hampshire; 212F - C. Carpenter; 212K - Bryan Hargrave, Minnesota Department of Natural Resources; 212L - from B. Leuelling; M212A - from M. Smith; M212B - from M. Smith; M212C - M. Smith; M212E - P. Rudge; 221E - James Omernik USEPA; 222A - Donald R. Kurz, Missouri Conservation Department; 222D - Ned Trovillion, independent photographer; 222I (upper) - James Omernik USEPA; 222I (lower) - M. Keister; 222L - James Omernik USEPA; M221A, M221B - from T. DeMeo; 251C - Donald R. Kurz, Missouri Conservation Department; 251D - Joel Dexter, Illinois State Geological Survey; 251E - Donald R. Kurz, Missouri Conservation Department.

Intermountain Region. M331D - from USDA Forest Service; M331D - J. Lott; M332F, 341B - J. Lott; M341C (first) - J. Lott; M341C (second) - P. Johnson.

Northern Region. M332B - K. McBride; M332E - A. Greene; M333B - J. Nesser.

Pacific Northwest Region. 242A, M242A (both), M242B (both), M242C (both), M332G, M333A, 342H - R. Menriss.

Pacific Southwest Region. M261A, M261B, M261D, M261G - S. Miles; M262A, M262B, M423A - D. Diaz.

Rocky Mountain Region. 251G - J. Freeouf; 331B - K. Grove; 331I - from J. Freeouf; 331J - from J. Freeouf; 332C - K. Grove; 332D - D. Steinke; M331A - K. Houston; M331B (upper) - J. Nesser; M331B (lower) - F. Lloyd; M331G - J. Freeouf; M331H - from J. Freeouf; M331I - from J. Freeouf; M331J - M. Holm; M334A - K. Grove; 342F - J. Freeouf; 342G - from J. Freeouf.

Southern Region. 221H - H. McNab; 221J - Glendon W. Smalley, retired, Southern Forest Experiment Station; M221D - Christine Coulter McNab, volunteer, USDA Forest Service; M222A - from C. Minehart; 231A - H. McNab; 231D - J. King; 231E - D. Bradbury; 231G - from C. Minehart; 232B (upper and lower) - H. McNab; 232C - B. Kaylor; 232D - from P. Beyer; 232F, 234A - J. Caldwell; M231A - from W. Pell; 255A, 315B, 315C - H. McNab; 411A - Mr. and Mrs. W. H. McNab, Jr., independent photographers; M411A (both) - from USDA Forest Service.

Southwestern Region. 313A, 313B, 313C, 313D, M313A, 321A, 322B, M331F - W. Robbie.

Miscellaneous:

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annual mean annual precipitation is 60 to 65 in (1,500 to 1,400 mm). Temperature averages 60 to 62 °F (16 to 17 °C). The growing season lasts for 200 to 210 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and associated rivers, mostly with low to moderate rates of flow and moderate velocity. Dendritic drainage pattern has developed, with influence from the underlying bedrock.

Disturbance Regimes. Fire has probably been the principal historical disturbance. Climatic influences include occasional summer droughts, winter ice storms, and occasional tornadoes.

Land Use. Natural vegetation has been cleared for agriculture on about 30 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southeastern Forest Experiment Station and Southern Region

Section 231D—Southern Ridge and Valley

Geomorphology. This section is in the Ridge and Valley geomorphic province. The area is a folded, faulted, and uplifted belt of parallel valleys and ridges, strongly dissected by differential erosion, mass wasting, fluvial erosion, and transport and deposition. About 60 percent of this Section consists of plains with hills and 40 percent consists of open high hills. Elevation ranges from 650 to 2,000 ft (200 to 600 m). Local relief ranges from 300 to 500 ft (90 to 150 m) in areas of plains, with elevation ranging from 500 to 1,000 ft (150 to 300 m) in areas of high hills.

Lithology and Stratigraphy. Rock units formed during the Paleozoic Era. Strata consists of a mosaic of marine deposits of Lower Cambrian clastic rocks (granites), and a mixture of marine deposits of Cambrian (carbonates and shales), Lower Ordovician (carbonates), and Mississippian (shales, limestone, and chert) ages.

Soil Taxa. Soils are mostly Udults with some Ochrepts. Paleudults dominate upland areas underlain by limestone. Hapludults are in valleys underlain by shale. Dystrichrepts are common on side slopes of ridges. Hapludolls and Entrochrepts are on bottom lands. Soils have an udic moisture regime and thermic or mesic temperature regime. Almost all soils are well drained. Soils range from shallow on sandstone and shales to very deep on limestone formations.

Potential Natural Vegetation. Küchler mapped vegetation as oak-hickory-pine forest and southern mixed forest. The predominant vegetation form is needle-leaved, evergreen trees with cold deciduous, broad-leaved forest. The principal cover type is oak-hickory, which includes

In some areas, loblolly and shortleaf pines are dominant.

Fauna. Among the fauna in this Section are white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, eastern chipmunk, white-footed mouse, pine vole, short-tailed shrew, and cotton mouse. The turkey, bobwhite, and mourning dove are game birds in various parts of this Section. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The herpetofauna include the box turtle, common garter snake, and timber rattlesnake.

Climate. Precipitation averages 36 to 55 in (900 to 1,400 mm) annually. Mean annual temperature is from 55 to 61 °F (13 to 16 °C). The growing season lasts about 170 to 210 days.

Surface Water Characteristics. This Section has a moderate density of small to medium size perennial streams and associated rivers, mostly with low to moderate rates of flow and moderate velocity. Trellis drainage pattern has developed with bedrock structural control. One of the major rivers draining this Section is the Coosa.

Disturbance Regimes. Fire has probably been the principal historical disturbance, previously burning over small areas between natural barriers with moderate frequency and low intensity. Insect related disturbances have resulted from southern pine beetles. Climatic related influences include occasional droughts and ice storms.

Land Use. Natural vegetation has been cleared for agriculture on over 60 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region and Southeastern Forest Experiment Station

Section 231E—Mid Coastal Plains, Western

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform occupying about 80 percent of the Section consists of moderately dissected irregular plains of marine origin. The plains were formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Other landforms consist of plains with hills and smooth plains. Elevations range from 80 to 650 ft (25 to 200 m). Local relief ranges from 100 to 300 ft (30 to 90 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Tertiary marine deposits (glauconitic sands and clays with lenses of coquina limestone; clay and silty clay).

Soil Taxa. Soils are predominantly Udults. Paleudults, Hapludults, Paludalfs, Paleudalfs, and Albaqualfs are on uplands. Fluvaquents, Udifuvents, Eutrochrepts, and Glossaqualfs are on bottom lands along major streams. Soils have a thermic temperature regime, a udic moisture regime, and siliceous or mixed mineralogy. Most soils have formed from sandstone and shale parent materials. Soils are generally coarse textured, deep, and have adequate moisture for plant growth during the growing season.

Potential Natural Vegetation. Küchler mapped this area as oak-hickory-pine forest, southern mixed forest, and southern floodplain forest. The predominant vegetation form consists of needle-leaved evergreen trees. Belts of cold deciduous, broad-leaved hardwoods are prevalent along rivers. The principal forest cover type is loblolly and longleaf pines. Where hardwoods are prevalent, species consist of post, white, blackjack, and southern red oaks. Species of bottom lands are red maple, green ash, Nuttall oak, sweetgum, and swamp hickory.

Fauna. The elk, mountain lion, wolf, Carolina parakeet, and ivory-billed woodpecker once inhabited this Section. Presently, the fauna include white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, striped skunk, swamp rabbit, and many small rodents and shrews. The turkey, bobwhite, and mourning dove are game birds in various parts of this Section. In flooded areas, ibises, cormorants, herons, egrets, and kingfishers are common. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The herpetofauna include the box turtle, common garter snake, and timber rattlesnake.

Climate. Annual precipitation averages 40 to 54 in (1,000 to 1,300 mm). Temperature averages 61 to 68 °F (16 to 20 °C). The growing season lasts about 200 to 270 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and associated rivers, most with moderate volume of water flowing at low velocity. Dendritic drainage pattern has developed. Major rivers draining this Section include the Red and Ouachita.

Disturbance Regimes. Fire has probably been the principal historical disturbance. Climatic influences include occasional summer droughts and winter ice storms, and infrequent hurricanes. Insect disturbances are often caused by southern pine beetles.

Land Use. Natural vegetation has been cleared for agriculture on about 25 percent of the area. Much of the non-cleared land is managed for forestry.

Cultural Ecology. Reserved.

Compiled by Southern Region and Southeastern Forest Experiment Station.

Section 231F—Eastern Gulf Prairies and Marshes

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation ranges from 10 to 330 ft (3 to 100 m). Local relief ranges from 0 to 100 ft (0 to 30 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Quaternary marine deposits (non-glacial sand, silt, and clay deposits of upland origin).

Soil Taxa. Aquolls, Sapristis, Aquents, and Hemists are the principal soils along the coast. Also along the coast are Aquolls, Haplaquolls, Medisapristis, Hydraquents, and Medihemists, all of which are poorly drained and subject to flooding and high water tables. These soils have a thermic temperature regime and an aquic moisture regime. Farther inland, Uderts and Aqualfs are the main soils, especially where saline prairie vegetation is present. Soils farther inland on low lands are Pelluderts, Pellusterts, Albaqualfs, Ochraqualfs, and Glossaqualfs. Situated on flood plains are Argiaquolls, Haplaquolls, and Haplaquepts. Soils have a thermic to hyperthermic moisture regime, and an aquic moisture regime. These soils are deep, clayey, poorly drained, and have subsoils that are slowly permeable.

Potential Natural Vegetation. Küchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. Predominant vegetation is mid to tall grass grasslands. Species consist of little bluestem, indiagrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. Typical large herbivores and carnivores include manatee, coyote, red wolf, ringtail, ocelots, and river otter. Smaller herbivores include swamp rabbit, fivetooth harvest mouse, eastern wood rat, and nutria. Common birds of freshwater marshes, lakes, ponds, and rivers include reddish egret, white-faced ibis, white-fronted goose, and oliveaceous cormorant. Attwater's prairie chicken was once common in the grasslands. Reptiles and amphibians include American alligator, Gulf coast salt marsh snake, Gulf coast toad and pig frog, diamondback terrapin, Mediterranean gecko, and the Texas horned lizard.

Climate. Average annual precipitation is from 30 to 55 in (750 to 1,400 mm). Temperature averages 66 to 74 °F (19 to 23 °C). The growing season lasts 250 to 330 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and very low density of associated rivers; most have a moderate volume of water at very low velocity. Water table is high in many areas, resulting in poor natural drainage and abundance of wetlands. Poorly defined drainage pattern has developed on this very young, weakly dissected plain. Abundance of palustrine systems having seasonally high water level. This Section adjoins the Louisianian Marine and Estuarine Province delineated by the USDI Fish and Wildlife Service.

Disturbance Regimes. Fire and ocean tides have likely been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been cleared for agricultural crops on about 40 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southeastern Forest Experiment Station and Southern Region.

Section 0045 Arkansas Valley

Geomorphology. This Section is in the Ouachita geomorphic province. The area consists of a folded, faulted, and uplifted belt of parallel valleys and ridges, moderately dissected by differential erosion, mass wasting, fluvial erosion and transport and deposition. About 80 percent of this land consists of plains with hills and 20 percent includes open low mountains. Elevation ranges from 330 to 3,000 ft (100 to 900 m). Local relief ranges from 300 to 500 ft (90 to 150 m) in areas with hills. Relief is 500 to 1,000 ft (150 to 300 m) in areas with low mountains.

Lithology and Stratigraphy. Rocks units formed during the Paleozoic Era. Strata consist of Pennsylvanian marine deposits (sandstone, shale, coal, and limestone).

Soil Taxa. Soils are predominately Udults. Hapludults and Paleudults are on ridgetops and upper slopes, and are also on mid to lower slopes in concave positions. Fragidults are in valleys. Soils along the Arkansas River include Udifluvents, Udipsamments, Haplaquolls, and Hapludalfs. Soils have a thermic temperature regime, a udic moisture regime, and siliceous or mixed mineralogy. Soils are variable in characteristics, ranging from shallow

season.

Potential Natural Vegetation. Küchler mapped vegetation as oak-hickory forest, oak-hickory-pine forest, cross timbers (*Quercus-Andropogon*), and southern floodplains forest. The predominant vegetation form is about equal areas of cold-deciduous, broad-leaved forest and needle-leaved evergreen trees. Principal forest cover types are oak-hickory and loblolly-shortleaf pine. Species include white, black, bur, post, and blackjack oaks; pignut and mockernut hickories; and loblolly and shortleaf pines. Oak-gum-cypress forest type is dominant along major river bottoms and includes cottonwood, sugarberry, river birch, and green ash.

Fauna. Historically, the elk, Florida panther, bison, passenger pigeon, hairy-billed woodpecker, Carolina parakeet, and Bachman's warbler inhabited this Section. Presently the fauna include white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, striped skunk, swamp rabbit, and many small rodents and shrews. In wooded areas, beavers, ibises, cormorants, herons, egrets, and kingfishers are common. Endemics include the Magazine Mountain shagreen, longnose darter, and Arkansas darter. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler and Carolina wren. The herpetofauna include the box turtle, common garter snake and timber rattlesnake.

Climate. Annual average precipitation is 44 to 50 in (1,120 to 1,270 mm). Average temperature is 61 to 63 °F (16 to 17 °C). The growing season lasts 200 to 240 days.

Surface Water Characteristics. This Section has a high density of small to medium size perennial streams and associated rivers; those in intermountain basins have moderate rates of flow and some on mountain sides are characterized by high rates of flow and velocity. A trellis drainage pattern has developed. One of the large rivers draining this Section is the Arkansas.

Disturbance Regimes. Reserved.

Land Use. Reserved.

Cultural Ecology. Reserved.

Compiled by Southern Region and Southeastern Forest

Section 232E-Louisiana Coast Prairies and Marshes

Geomorphology. This Section is in the Coastal Plains geomorphic Province. The predominant landform is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore-zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation ranges from 0 to 160 ft (0 to 50 m). Local relief ranges from 0 to 50 ft (0 to 15 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Quaternary marine deposits of terrestrial origin, non glacial sand, silt, and clay.

Soil Taxa. Aquolls, Sapristis, Aquents, and Hemists are the principal soils along the coast. Also along the coast are Aquolls, Haplaquolls, Medisapristis, Hydraquents, and Medihemists, all of which are poorly drained and subject to flooding and high water tables. These soils have a thermic temperature regime and an aquic moisture regime.

Potential Natural Vegetation. Küchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. Much of the existing vegetation is nonforested grasslands. Prairie grasslands dominate areas inland from the coast and consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. Large herbivores and carnivores include manatee, coyote, red wolf, ringtail, and river otter. Ocelots were once common, but are now rare. Smaller herbivores include swamp rabbit, fuscous harvest mouse, eastern wood rat, and nutria. Birds of fresh water marshes, lakes, ponds, and rivers include reddish egret, white-faced ibis, white-fronted goose, and oliveaceous cormorant. Birds of grasslands include Attwater's prairie chicken. Reptiles and amphibians include the Gulf coast salt marsh snake, Gulf coast toad, pig frog, American Alligator, diamondback terrapin, Mediterranean gecko, and Texas horned lizard.

Climate. Annual precipitation averages 25 to 55 in (620 to 1,400 mm). Temperature averages 68 to 70 °F (20 to 21 °C). The growing season lasts 280 to 320 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and very low density of associated rivers, most with moderate volume of water at very low velocity. Water table is high in many areas, resulting in poor natural drainage and an abundance of wetlands. The Mississippi River flows

through this Section into the Gulf of Mexico. Palustrine systems are abundant and have seasonally high water levels. This Section adjoins the Louisianian Marine and Estuarine Province delineated by the USDI Fish and Wildlife Service.

Disturbance Regimes. Fire and ocean tides have probably been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been converted to agricultural crops on about 40 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southeastern Forest Experiment Station and Southern Region.

Section 232F-Coastal Plains and Flatwoods, Western Gulf

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform consists of weakly to moderately dissected irregular plains of alluvial origin formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore zone processes are active in developing and maintaining beaches, swamps, and mud flats. About 80 percent of this Section consists of irregular plains. Other landforms include flat plains and plains with hills. Elevation ranges from 80 to 660 ft (25 to 200 m). Local relief mostly ranges from 100 to 300 ft (30 to 90 m) on irregular plains; however, relief ranges from 0 to 100 ft (0 to 30 m) on flat plains and 300 to 500 ft (90 to 150 m) where plains with hills are present.

Lithology and Stratigraphy. Rocks in this Section formed during the Cenozoic Era. About 80 percent of the geologic strata consist of Tertiary marine deposits, including glauconitic, calcareous, fossiliferous strata with lignitic sandy and argillaceous contents. Quaternary marine deposits are present along the Red River.

Soil Taxa. Soils are mostly Udults. Paleudults, Hapludults, Hapludalfs, Paleudalfs, and Albaqualfs are on uplands. Fluvaquents, Udifluvents, Eutrochrepts, and Glossaqualfs are along major streams. Soils are mostly derived from weathered sandstone and shale. Soils have a thermic temperature regime, a udic moisture regime, and siliceous or mixed mineralogy. Soils are deep, coarsely textured, mostly well drained, and have an adequate supply of moisture for use by vegetation during the growing season.

Potential Natural Vegetation. Küchler mapped vegetation as southern mixed forest, oak-hickory-pine forest, and southern flood plain forest. The predominant vegetation form is evergreen needle-leaved forest with a small area of cold-deciduous alluvial forest. The slash pine and longleaf pine cover type dominates most of

the Section. The loblolly pine-shortleaf pine cover type is common in the northern parts of the Section. A bottomland type is prevalent along most major rivers and consists of cottonwood, sycamore, sugarberry, hackberry, silver maple, and red maple.

Fauna. The elk, mountain lion, wolf, Carolina parakeet, and ivory-billed woodpecker once inhabited this Section. The endangered Florida panther may be encountered rarely. Presently, the fauna include white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, striped skunk, swamp rabbit, and many small rodents and shrews. The presence of turkey, bobwhite, and mourning dove is widespread. Resident and migratory nongame bird species are numerous, as are species of migratory waterfowl. In flooded areas, ibises, cormorants, herons, egrets, and kingfishers are common. Songbirds include the red-eyed

vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The endangered red-cockaded woodpecker and bald eagle inhabit this Section. The herpetofauna include the box turtle, common garter snake, eastern diamondback rattlesnake, timber rattlesnake, and American alligator.

Climate. Precipitation averages 40 to 54 in (1,020 to 1,350 mm) annually. Annual temperature averages 61 to 68 °F (16 to 20 °C). The growing season lasts 200 to 270 days.

Surface Water Characteristics. This Section has a moderate density of small to medium size perennial streams and associated rivers. Dendritic drainage pattern has developed without bedrock structural control. Major rivers include the Sabine, Red, and Mississippi.

Disturbance Regimes. Fire has probably been the principal historical disturbance. Climatic influences include occasional summer droughts and winter ice storms and infrequent hurricanes. Insect disturbances are often caused by southern pine beetles.

Land Use. Natural vegetation has been cleared for agriculture on about 60 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region and Southeastern Forest Experiment Station.



Characteristic upland longleaf pine landscape in the Coastal Plains and Flatwoods, Western Gulf Section on the Kisatchie National Forest.

~~Section 22C, Florida Coastal Lowlands (Eastern)~~

Geomorphology. This Section is in the Coastal Plains geomorphic Province. The predominant landform is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation averages 52 to 64 in (1,300 to 1,600 mm). There is little local relief.

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. About 50 percent of the strata consist of Tertiary marine deposits, limestone interbedded with marl, sand, and clay. Quaternary marine deposits make up the other strata and include sand, silt, and clay.

Soil Taxa. Dominant soils are Aquults, Aquolets, Aquods, and Aqueuts. A complex of Paleaquults, Haplaquods, Quartzipsamments, and Sulfaquents occurs throughout the Section. Many locations near the coast are very poorly drained Sulfaquents, Sulphemists, and Hydraquments. Other coastal areas consist of excessively

Province 255—Prairie Parkland (Subtropical)

Four Sections have been delineated in this Province: 255A—Cross Timbers and Prairie; 255B—Blackland Prairies; 255C—Oak Woods and Prairies; and 255D—Central Gulf Prairies and Marshes. These Sections are located in Oklahoma and Texas. The area of these Sections is about 80,100 mi² (207,500 km²).

Section 255A—Cross Timbers and Prairies

Geomorphology. This Section is in the Central Lowlands geomorphic province. The predominant landform on about 70 percent of the Section consists of irregular plains that originated from uplift of level bedded continental sediments, that had been deposited into a shallow inland sea, followed by a long period of erosion. Other landforms include plains with hills and open high hills. Elevation ranges from 330 to 1,300 ft (100 to 400 m). Local relief ranges from 100 to 300 ft (30 to 90 m).

Lithology and Stratigraphy. Rock units were formed during the Paleozoic (30 percent) and Mesozoic (70 percent) Eras. Paleozoic strata consist of Pennsylvanian marine deposits (sandstone, shale, coal, and limestone). Mesozoic strata consist of Lower Cretaceous marine deposits (limestone).

Soil Taxa. Soils in the Cross Timbers region are mainly Ustalfs. Paleustalfs and Haplustalfs are on uplands. Ustifluvents and Haplustolls are on narrow flood plains. Soils have a thermic temperature regime, a ustic moisture regime, and mixed or siliceous mineralogy. Soils are deep, well drained, and moderate textured; moisture is limited for use by vegetation during part of the growing season. Soils in the Prairie region are Ustolls, Userts, and Ochrepts. Pellusterts and Chromusterts are on upland valleys. Calciustolls are on smooth uplands. Haplustolls, Calciustolls, and Argiustolls are on areas of limestone



Viewed from a cuesta in central Texas, east of Abilene, predominant vegetation consists of midgrasses, juniper, mesquite, and blackjack, and post oaks. Other cuestas are visible on the horizon. Reduced precipitation causes trees to be short and shrubby.

parent material. Ustochrepts and Calcistolls occur on steep plateau sideslopes. Haplustolls are on flood plains. Argistolls and Haplustalfs are on smooth uplands in northern areas of the Section. Soil temperature regime is thermic, moisture regime is ustic, and mineralogy is montmorillonitic, mixed, or carbonatic. Generally, soils are deep, fine textured, and well drained; moisture is limited for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Küchler classified vegetation as cross timbers (*Quercus-Andropogon*), oak-hickory forest, and oak-hickory-pine forest. The predominant vegetation form is cold-deciduous broad-leaved forest and extensive areas of tall grassland with a tree layer. Forest cover consists of post, live, and blackjack oaks, and pignut and mockernut hickories. Grasses consist of big and little bluestems, indiangrass, and sunflower.

Fauna. Among the fauna in this Section are white-tailed deer, black bear, bobcat, gray fox, raccoon, cottontail rabbit, gray squirrel, fox squirrel, eastern chipmunk, white-footed mouse, pine vole, short-tailed shrew, and cotton mouse. The turkey, bobwhite, and mourning dove are game birds in various parts of this Section. Songbirds include the red-eyed vireo, cardinal, tufted titmouse, wood thrush, summer tanager, blue-gray gnatcatcher, hooded warbler, and Carolina wren. The herpetofauna include the box turtle, common garter snake and timber rattlesnake.

Climate. Precipitation averages 35 to 40 in (900 to 1,050 mm). About 5 to 18 in (120 to 450 mm) of snow falls annually. Temperature averages 55 to 63 °F (13 to 17 °C). The growing season lasts 190 to 235 days.

Surface Water Characteristics. This Section has a low to moderate density of perennial streams and associated rivers, mostly with low to moderate rates of flow and moderate velocity. Dendritic drainage patterns have developed. One of the major rivers draining this Section is the Red. A relatively large number of water reservoirs have been constructed.

Disturbance Regimes. Fire and drought have probably been the principal historical sources of disturbance.

Land Use. Natural vegetation has been cleared for agricultural crops on about 75 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 255B-Blackland Prairies

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform is irregular plains. This Section is an elevated sea bottom that has been shaped by marine and shore-zone processes resulting from repeated episodes of submergence and

emergence of the land from the ocean. Some geomorphic processes currently active throughout the area are gentle gradient valley stream erosion, transport and deposition. Elevation ranges from 330 to 660 ft (100 to 200m). Local relief ranges from 100 to 300 ft.

Lithology and Stratigraphy. Rock units in this Section formed during the Mesozoic (10 percent) and Cenozoic (90 percent) Eras. Mesozoic strata consist of Upper Cretaceous marine deposits (shales, marls, and chalks). Cenozoic strata consists of Tertiary marine deposits.

Soil Taxa. Soils are Usterts, Ustolls, Aqualfs, and Ustalfs. Pellusterts are in upland valleys. Chromusterts are on eroded uplands. Haplustolls and Ustorthents are along an Austin chalk escarpment. Calcistolls and Haplustolls are along stream terraces. Albaqualfs, Ochraqualfs, and Paleustalfs are on uplands. Pelluderts, Haplaqualfs, and Chromusterts are on flood plains. These soils have a thermic temperature regime, a ustic or aquic moisture regime, and montmorillonitic or mixed mineralogy. Generally, soils are deep, mostly well drained, medium to fine textured, and have limited soil moisture supplies for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Küchler mapped vegetation as blackland prairie (*Andropogon-Stipa*) and juniper-oak savanna. The predominant vegetation form is tall grassland consisting mainly of bunch grasses, such as indiangrass, big bluestem, switchgrass, and eastern gamagrass. A savanna community occurs along many major rivers, consisting of elm, pecan, cottonwood, and hackberry, with grasses between the trees.

Fauna. Faunal communities are characterized by species associated with a prairie climate and vegetation. Typical large herbivores and carnivores include coyote, ringtail, and collared peccary. Smaller herbivores include plains pocket gopher, fulvous harvest mouse, and northern pygmy mouse. Ocelots were once common, but are now rare. The bison is historically associated with the Section. Birds are typical of grass and shrublands; residents include many common species, such as turkey vulture, hairy woodpecker, cardinal, and yellow warbler. Smith's longspur, a bird of the Arctic tundra, winters here. Amphibians and reptiles typical of this area include eastern spadefoot toad, Great Plains narrow-mouthed frog, green toad, Texas toad, Gulf Coast toad, yellow mud turtle, Texas horned lizard, Texas spiny lizard, and Texas blind snake.

Climate. Precipitation ranges from 30 to 45 in (750 to 1,150 mm), occurring mainly in spring from April through May. Temperature averages 63 to 70 °F (17 to 21 °C). The growing season lasts 230 to 280 days.

Surface Water Characteristics. Reserved.

Disturbance Regimes. Fire and drought have probably been the principal historical sources of disturbance.

Land Use. Natural vegetation has been changed to agricultural crops on about 75 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 255C-Oak Woods and Prairies

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform on about 80 percent of the Section consists of irregular plains. Other landforms include plains with hills and smooth plains. This Section is an elevated sea bottom that has been shaped by marine and shore-zone processes resulting from repeated episodes of submergence and emergence of the land from the ocean. Some geomorphic processes currently active throughout the area are gentle gradient valley stream erosion, transport and deposition. Elevation ranges from 650 to 1,310 ft (200 to 400 m). Local relief ranges from 100 to 300 ft.

Lithology and Stratigraphy. Rocks units formed during the Cenozoic Era. Strata are Tertiary marine sediments consisting of glauconitic, calcareous, fossiliferous strata with lignitic sandy and argillaceous deposits.

Soil Taxa. Soils are mostly Ustals. Paleustals and Albaqualls are on uplands and other areas with thick sandy surface. Pelluderts, Pellusterts, and Hapludolls are on flood plains and clayey terraces along major rivers. These soils have a thermic temperature regime, an ustic moisture regime, and montmorillonitic mineralogy. Soils are deep, medium textured, and generally have a slowly permeable, clayey subsoil. Moisture may be limiting for plant growth during parts of the year.

Potential Natural Vegetation. Kuchler classified vegetation as oak-hickory forest, cross timbers (*Quercus-Andropogon*), and juniper-oak savanna. The predominant vegetation type is cold-deciduous, broad-leaved forest. The oak-hickory cover type consists of scarlet, post, and blackjack oaks, and pignut and mockernut hickories. Forests of elm, pecan, and walnut are in bottomlands. Little bluestem is the dominant grass.

Fauna. Faunal communities are characterized by species associated with a temperate, subhumid, forested environment. Common large herbivores and carnivores include coyote, ringtail, ocelot, and collared peccary. Smaller herbivores include plains pocket gopher, fulvous harvest mouse, northern pygmy mouse, southern short-tailed shrew, and least shrew. Jaguar and bison are historically associated with this Section. Birds typical of this Section include many wide-spread species, such as eastern bluebird, eastern meadowlark, grasshopper sparrow, mourning dove, Cooper's hawk, and mockingbird. Amphibians and reptiles include eastern spadefoot toad, Great Plains narrow-mouthed frog, green toad, yellow mud turtle, Texas horned lizard, Texas spiny lizard, and Texas blind snake.

Climate. Annual precipitation ranges from 27 to 40 in (700 to 1,000 mm). Temperature ranges from 63 to 70 °F (17 to 21 °C). The growing season lasts 200 to 260 days.

Surface Water Characteristics. There is a low density of small to medium size perennial streams and associated rivers, most with moderate volume of water flowing at low velocity. A major river draining this Section is the Trinity.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops on about 75 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 255D-Central Gulf Prairies and Marshes

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform consists of a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore-zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation ranges from sea level to 160 ft (0 to 50 m). Local relief ranges from 0 to 100 ft.

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. Strata consist of Quaternary marine deposits (non-glacial sand, silt, and clay deposits) of continental origin.

Soil Taxa. Soils are Aquepts, Aqualls, Aquolls, and Aquepts. Psammaquepts, Udipsammaquepts, Fluvaquepts, and Salorthids are on barrier islands and long bays. Haplaquolls, Natraqualls, Pelluderts, and Pellusterts are on low coastal terraces. Ochraqualls, Albaqualls, and Paleudals are found on plains. Haplaquolls, Haplaquepts, and Fluvaquepts are on coastal flats and flood plains. These soils have a hyperthermic and thermic temperature regime, an aquic moisture regime, and montmorillonitic, mixed, or siliceous mineralogy. Soils are fine to coarse textured, saline, and mostly poorly drained with high water tables.

Potential Natural Vegetation. Kuchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. The predominant vegetation form is tall grassland consisting mainly of bunch grasses. Prairie grasslands dominate areas inland from the coast and consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and

saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. Large to medium size herbivores and carnivores include coyote, ringtail, hog-nosed skunk, river otter, ocelot, and collared peccary. Smaller herbivores include swamp rabbit, plains pocket gopher, fulvous harvest mouse, northern pygmy mouse, and nutria. Bison and jaguar are historically associated with this Section. Birds of fresh water marshes, lakes, ponds, and rivers include reddish egret, white-faced egret, white-fronted goose, and olivaceous cormorant. Birds of these grassland include white-tailed hawk, bronzed cowbird, and Attwater's prairie chicken. The rare whooping crane winters in this Section at the Aransas National Wildlife Refuge. Reptiles include American alligator, Gulf coast salt marsh snake, Mediterranean gecko, keeled earless lizard, Texas horned lizard, Texas spiny lizard, and Texas blind snake. Amphibians common to this Section include Gulf coast toad and diamondback terrapin.

Climate. Annual precipitation ranges from 25 to 55 in (620 to 1,400 mm). Temperature averages 68 to 70 °F (20 to 21 °C). The growing season lasts 280 to 320 days.

Surface Water Characteristics. There is a moderate density of small to medium size perennial streams and a low density of associated rivers, most with moderate volume of water flowing at very low velocity. The water table is high in many areas, resulting in poor natural drainage and abundance of wetlands. A poorly defined drainage pattern has developed on very young plains. An abundance of palustrine systems are present, having seasonally high water level. This Section adjoins the Carolinian and Louisianian Marine and Estuarine Provinces.

Disturbance Regimes. Ocean tides have probably been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been converted to agricultural crops on about 40 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Province 311—Great Plains Steppe and Shrub

One Section has been delineated in this Province: 311A—Redbed Plains, most of which is located in Oklahoma. The area of this Section is about 17,600 mi² (45,600 km²).

Section 311A—Redbed Plains

Geomorphology. This Section is in the Central Lowlands geomorphic province. Platform uplift of continental sediments deposited previously into a shallow inland sea, followed by a long period of erosion; these processes resulted in a moderately to strongly dissected region. About 70 percent of this Section consists of irregular plains. Other landforms include about equal areas of plains with low mountains, smooth plains, and tablelands. Elevation ranges from 1,600 to 3,000 ft (500 to 900 m). Local relief in much of the Section ranges from 100 to 300 ft (30 to 90 m). Smaller areas are present where relief ranges from 30 to 60 ft (10 to 20 m) in tablelands and up to 1,000 ft (300 m) in low mountains.

Lithology and Stratigraphy. Rocks formed during the Paleozoic Era. About 80 percent of the geologic strata consist of Permian marine deposits (sandstone, shale, and limestone). Other strata include Quaternary marine deposits and small isolated areas of Lower Cretaceous marine deposits (limestone).

Soil Taxa. Soils are Ustolls, Ustalfs, and Ochrepts. Most soils are on uplands and include Argiustolls, Paleustolls, Natrustolls, Haplustalfs, Paleustalfs, and Ustochrepts. Localized areas of Ustifluvents are on flood plains. These soils have a thermic temperature regime, a ustic moisture regime, and mixed mineralogy. Most soils are deep, well drained, variable in texture, and have limited moisture supplies for use by vegetation during part of the growing season.

Potential Natural Vegetation. Küchler classified vegetation as bluestem-grama prairie, and cross timbers (*Quercus-Andropogon*); shinnery (*Quercus-Andropogon*); and sandsage-bluestem prairie. The predominant

vegetation form is medium-tall grasslands with sparse tree cover. Grasses consist mainly of sand bluestem, little bluestem, and sand saltbrush.

Fauna. Representative large to medium size herbivores and carnivores include coyote, ringtail, and ocelot. Small herbivores include eastern cottontail, desert shrew, plains pocket mouse, Texas kangaroo rat, and prairie vole. Bison and black-footed ferret are historically associated with this Section. Common birds of thickets and grasslands include the roadrunner, bobwhite, barn owl, scissor-tailed flycatcher, and common crow. The golden-fronted woodpecker has a more restricted range. Amphibians common to this environment include Plains spadefoot toad, Great Plains narrow-mouthed frog, green toad, spotted chorus frog, and yellow-mud turtle. Typical reptiles include lesser earless lizard, Texas horned lizard, Prairie skink, and Texas blind snake.

Climate. Precipitation averages 20 to 30 in (500 to 750 mm); snow averages 20 to 30 in (500 to 750 mm) annually. Temperature averages 57 to 64 °F (14 to 18 °C). The growing season lasts 185 to 230 days.

Surface Water Characteristics. The area has a low density of small to medium intermittent streams and associated rivers, most with a low volume of water flowing at low velocity. Dendritic drainage pattern has developed without bedrock structural control. Major rivers include the Washita, Canadian, and Red.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops or pasture on about 90 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region and Southeastern Forest Experiment Station.

Province 315—Southwest Plateau and Plains Dry Steppe and Shrub

Six Sections have been delineated in this Province: 315A—Pecos Valley; 315B—Texas High Plains; 315C—Rolling Plains; 315D—Edwards Plateau; 315E—Rio Grande Plain; and 315F—Southern Gulf Prairies and Marshes. These Sections are located in the New Mexico and Texas. The area of these Sections is about 160,900 mi² (416,700 km²).

Geomorphology. This section is in the Great Plains physiographic province. It is located in west-central New Mexico. Major landforms are plains, hills, basins, and fans. Major landform features include the Pecos Plains and the Canadian Valley. Elevation range from 4,000 to 6,900 ft (1,200 to 2,100 m).

Lithology and Stratigraphy. There are Paleozoic, Mesozoic, and Cenozoic aged sedimentary and volcanic rocks and alluvial deposits.

Soil Taxa. Soils include Haplustalfs, Ustochrepts, Argiustolls, Haplustolls, and a few Haplargids, Calcithiids, and Ustorthents.

Potential Natural Vegetation. Vegetation consists of grama and galleta grass, piñon-juniper in mesic soil temperature regimes, and ustic soil moisture regimes, and mesquite bush in aridic soil moisture regimes.

Fauna. Reserved.

Climate. Precipitation ranges from 8 to 16 in (200 to 400 mm) annually, with less than half of the precipitation falling in the winter. Temperature ranges from 45 to 70 °F (7 to 21 °C) and winters are cold. The growing season last 160 to 200 days.

Surface Water Characteristics. Water is scarce throughout this Section because of low annual accumulation and erratic precipitation. Only a few perennial streams exist. Ground water in deep sand and gravel deposits or where limestone residuum exists provides for domestic and livestock use.

Disturbance Regimes. Fires vary in frequency and intensity, depending on fuel load and moisture.

Land Use. The land in most of this Section is in farms, ranches, or private holdings. More than 75 percent of the area is managed as rangeland with cattle and sheep grazing.

Cultural Ecology. Although there are periods of population expansion and periods of decline, sometimes

includes the Pecos Valley Section, for at least 12,000 years. There is inconclusive evidence of substantial earlier occupation. A dependency on hunting of large herbivores which, in turn, were dependent on the vast grasslands of this Province, characterized man-ecosystem relationships for the first 11,000 years of this 12,000 year period. The earliest well-dated sites are those of mobile peoples who, early in this period, hunted mammoth but later hunted a now extinct species of bison. In time the big game hunters were followed by peoples with a more diversified subsistence based on hunting a variety of animals, but, with, no doubt, were heavily dependent on hunting modern bison and gathering a variety of plant resources. The addition of farming about 1,000 years ago, in combination with hunting and wild plant gathering, eventually led to the appearance of settled villages located sporadically along perennial water courses.

About the beginning of the historic period, the settled village life of plains agriculturalists was supplanted by a re-appearance of groups more heavily dependent on hunting, supplemented with some farming. These relatively mobile groups included Apache and Comanche, with a later appearance of Kiowa. One practice which allowed mobile, hunting plains peoples to exist with diminished emphasis on farming was considerable trade. In the late 1700's and early 1800's, trade began with Puebloan peoples to the west in the foothills of the Sangre de Cristo Mountains. Historic trails, including the Santa Fe Trail, passed through the Pecos Valley Section. These trails were important in the movement west of Anglo settlers and in the movement of cattle and other commodities. The advent of transcontinental railroads in the late 1800's contributed greatly to slaughter of the buffalo, after which time hunting was never again an important subsistence pursuit in the area. Military subjugation of Native American peoples, in combination with the railroads, led to relatively rapid settlement of the western plains by Anglos, who established a rural lifestyle based largely on farming and ranching, which persists to the present.

Section 315B—Texas High Plains

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform consists of a broad, extensive flat plain formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, followed by sheet erosion and transport. These processes resulted in a region of moderate dissection. Elevation ranges from 2,600 to 6,500 ft (800 to 2,000 m). Local relief in most of the Section

ranges from 100 to 300 ft, however, relief in the tablelands ranges from 300 to 500 ft.

Lithology and Stratigraphy. Rocks were formed during the Paleozoic (10 percent), Mesozoic (10 percent), and Cenozoic (80 percent) Eras. Paleozoic strata consist of Permian marine deposits (sandstone, shale, and limestone). Mesozoic strata consist of Triassic continental deposits (sandstone). Cenozoic strata consist of Tertiary Period deposits (poorly consolidated silt, sand, and gravel in varying proportions).

Soil Taxa. Soils are Ustolls and Ustalfs. Paleustolls, Argiustolls, Paleustalfs, and Haplustalfs are on uplands. Calcistolls, Haplustolls, and Paleustolls are on ridges and steeper slopes. Haplustolls occur on young valley floors. Pellusterts are in clayey playa-lake basins. Calcithids, Paleorthids, and Torriorthents are on steep slopes in breaks. These soils have a mesic or thermic temperature regime, a ustic moisture regime, and mixed or carbonatic mineralogy. Soils are deep, fine to coarse textured, well drained, and have limited soil moisture for use by vegetation during parts of the growing season.

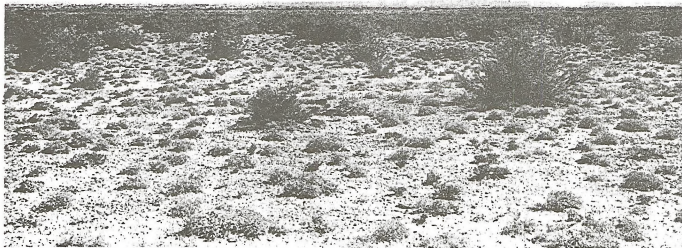
Potential Natural Vegetation. Küchler classified vegetation as grama-buffalo grass and shinny (Quercus-Andropogon). The predominant vegetation form is short grass communities composed of bunch grasses with a sparse shrub layer. Species include short grasses (blue gramma, and buffalograss), sagebrush, mesquite, and yucca.

Fauna. Typical large to medium size herbivores and carnivores include pronghorn, coyote, swift fox, ringtail,

and ocelot. Typical smaller herbivores include desert shrew, desert cottontail, black-tailed prairie dog, yellow-faced pocket gopher, plains pocket mouse, silky pocket mouse, hispid pocket mouse, and white-throated woodrat. Bison are historically associated with this Section. Birds of grasslands include many species that typically occur over a wide area, such as roadrunner, house finch, yellow warbler, willow flycatcher, cedar waxwing, western kingbird, and golden eagle. The lesser prairie chicken, found here, is restricted to the more arid grasslands. Amphibians found in this Section include plains spadefoot toad, Couche's spadefoot toad, western spadefoot toad, plains leopard frog, Great Plains toad, green toad, red spotted toad, spotted chorus frog, and yellow-mud turtle. Reptiles include species such as Texas horned lizard, round-tailed horned lizard, Great Plains skink, Texas blind snake, and plains black-headed snake.

Climate. Precipitation averages 15 to 22 in (370 to 550 mm), occurring mainly in the spring and fall. Temperature averages 55 to 63 °F (13 to 17 °C). The growing season lasts 130 to 220 days.

Surface Water Characteristics. There is a low density of small intermittent streams and few associated rivers, all with low volume of water flowing at low velocity. A shallow dendritic drainage pattern has developed. Major rivers include the Canadian and Red. The Canadian River, in north Texas, is deeply incised into the Great Plains plateau and has developed a broad area (up to 50 mi wide) of complex topography locally known as "The Breaks." Playa lakes are common in the western part of this Section.



The predominant landform of the Texas High Plains Section is a flat plain having dry soils. Precipitation is sufficient to support only a sparse herbaceous layer of short bunch grasses and scattered low, woody shrubs.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops or pasture on about 90 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 315C—Rolling Plains

Geomorphology. This Section is in the Central Lowlands geomorphic province. Landforms originated from platform uplift of continental sediments deposited previously into a shallow inland sea, followed by a long period of erosion. These processes resulted in a moderately dissected landscape. About 80 percent of this Section is equally divided between irregular plains and tablelands. Smaller areas of smooth plains and plains with hills are also present. Elevation ranges from 1,640 to 2,950 ft (500 to 900 m). Local relief in most of the Section ranges from 100 to 300 ft. Smaller areas are present where local relief ranges from 300 to 500 ft.



Flat terrain near Odessa, Texas, dominated by sparse cover of low grasses. Rocks beneath this landscape formed in a "Permian Basin" from which crude oil is now extracted.

Lithology and Stratigraphy. Rocks were formed during the Paleozoic and Mesozoic Eras. Geologic strata consist of about equal amounts of Permian marine deposits and Triassic continental deposits (sandstone). A small area of Permian continental deposits (sandstone, shale, and limestone) is also present.

Soil Taxa. Soils are Ustolls, Ustalfs, and Ochrepts. Most soils are on uplands and include Argiustolls, Paleustolls, and Natrustolls, Haplustalfs, Paleustalfs, and Ustochrepts. Localized areas of Ustifluents are on flood plains. These soils have a thermic temperature regime, a ustic moisture regime, and mixed mineralogy. Most soils are deep, well drained, variable in texture, and have limited moisture for use by vegetation during part of the growing season.

Potential Natural Vegetation. Küchler classified vegetation as mesquite-buffalo grass. The predominant vegetation form is medium-tall grassland with a sparse shrub cover. The vegetative community consists of sand and little bluestems and sagebrush.

Fauna. The faunal community consists of species suited to a semi-arid environment. Large to medium-size mammals include coyote, ringtail, ocelot, and collared peccary. Typical smaller herbivores include desert cottontail, hispid pocket mouse, Texas kangaroo rat, Texas mouse, desert shrew, and rock squirrel. Bison and black-footed ferret are historically associated with this Section. Domesticated cattle are the most common large herbivore. Birds of thickets and grasslands include black-capped vireo, Harris' sparrow, scaled quail, golden-fronted woodpecker, and pyrrhuloxia. Amphibians include Couche's spadefoot toad, Great Plains narrow-mouthed frog, green toad, red-spotted toad, and Texas toad. The spotted chorus frog, yellow-mud turtle, and Texas map turtle are in wetter areas. Common reptiles include lesser earless lizard, crevice spiny lizard, Texas spotted whiptail, Great Plains skink, prairie skink, four-lined skink, western hook-nosed snake, and plains black-headed snake.

Climate. Precipitation averages 20 to 30 in (500 to 750 mm). Temperature averages 57 to 64 °F (14 to 18 °C). The growing season lasts 185 to 230 days.

Surface Water Characteristics. There is a low density of small intermittent streams and few associated rivers, all with low volume of water flowing at low velocity. A dendritic drainage pattern has developed. Major rivers include the Colorado and Brazos.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been converted to agricultural crops or pasture on much of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 315D-Edwards Plateau

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform consists of a broad, extensive flat plain formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, followed by sheet erosion and transport; these processes resulted in a region of moderate dissection. About 90 percent of this Section consists of landforms equally divided between smooth plains and tablelands having moderate relief. Also included are smaller areas of open high hills, high hills, and plains with hills. Elevation ranges from 650 to 4,000 ft (200 to 1,200 m). Local relief in most of the Section ranges from 100 to 300 ft (30 to 90 m). In a small area of hills, relief ranges from 300 to 500 ft (90 to 150 m).

Lithology and Stratigraphy. Rock units in this Section were formed during the Precambrian (10 percent), Paleozoic (30 percent), and Mesozoic (60 percent) Eras. Precambrian strata consist of metamorphic rocks of paragneiss and schist structures and plutonic and intrusive rocks of granitic composition. Paleozoic strata consist of a mixture of Cambrian (carbonates) and lower Ordovician marine deposits (carbonates). Mesozoic strata consist of Cretaceous marine deposits (limestone and sandstone).

Soil Taxa. Soils are mostly Ustolls. Calciustolls are on limestone hills and plateaus. Chromusterts are on outwash plains and broad plateaus. Ustochrepts are on marl and chalk hills. Haplustolls are on stream deposits of valley floors. These soils have a thermic temperature regime, a ustic moisture regime, and carbonatic or montmorillonitic mineralogy. Soils are generally shallow, fine textured, and have limited soil moisture for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Küchler classified vegetation as juniper-oak savanna and mesquite-acacia-savanna. The predominant vegetation form is mid to short grasslands and evergreen scale-leaved woodlands with a sparse cover of drought-deciduous shrubs. A mixture of species may occur, including blackjack oak, red cedar, mesquite, live oak, and species of mid and short grass grasslands.

Fauna. Common large to medium size herbivores and carnivores include coyote, ringtail, coati, hog-nosed skunk, ocelot, and collared peccary. Smaller herbivores include Mexican ground squirrel, white-ankled mouse, and prairie vole. Bison are historically associated with this Section. Domesticated cattle are the most common large herbivores. Birds of thickets typically found here include scaled quail, golden-fronted woodpecker, golden-cheeked warbler, pyrrhuloxia, and long-billed thrasher. Amphibians include Couche's spadefoot toad, Rio Grande leopard frog, Great Plains narrow-mouthed frog, green toad, Texas toad, spotted chorus frog, barking frog, cliff chipping frog, and Texas map turtle. A number of salamanders in this Section have a very restricted range: San Marcos, Texas, Cormal blind, Valdina Farms, and Texas blind. Typical reptiles include Mediterranean gecko,

spot-tailed earless lizard, keeled earless lizard, Texas spiny lizard, Great Plains skink, and four-lined skink.

Climate. Annual precipitation ranges from 15 to 30 in (375 to 750 mm). Average temperature is 64 to 68 °F (18 to 20 °C). The growing season lasts 230 to 270 days.

Surface Water Characteristics. A low density of small intermittent and occasional perennial streams occurs here. All generally have a low volume of water flowing at low velocity, except along the plateau escarpment, where flow rates can be high. A dendritic drainage pattern has developed. Major rivers include the Brazos and Colorado.

Disturbance Regimes. Fire and drought have probably been the principal historical disturbances.

Land Use. Natural vegetation has been changed to agricultural crops or pasture on about 90 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 315E-Rio Grande Plain

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform in this Section is a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto submerged, shallow continental shelf, which was later exposed by sea level subsidence. Elevation ranges from 80 to 1,000 ft (25 to 300 m). Local relief in most of the Section ranges from 100 to 300 ft (30 to 90 m).

Lithology and Stratigraphy. Rocks formed during the Cenozoic Era. These strata consist of Tertiary marine deposits (glauconitic, calcareous, fossiliferous layers with lignitic sandy and argillaceous deposits).

Soil Taxa. Soils are Usterts, Torrerts, and Ustalfs. Pellusterts are on plains over clayey marine sediments. Paleustalfs are on eolian plains. Torrerts, Haplustolls, Calciustolls, Paleustalfs, and Haplustalfs are on plains. Calciustolls and Calciorthis are on plains over marine sediments. Soils have a hyperthermic temperature regime, a ustic or aridic moisture regime, and mixed mineralogy. Soils are mostly deep, fine to coarse textured, well drained, and have limited soil moisture for use by vegetation during the growing season.

Potential Natural Vegetation. Küchler classified vegetation as mesquite-acacia-savanna and ceniza shrub. The predominant vegetation form is short grassland with a sparse cover of drought deciduous shrubs. Species include mesquite, cactus, and tall and mid grasses. Live oaks and cottonwoods may be present along stream banks.

Fauna. Typical large to medium size herbivores and carnivores include coyote, ringtail, hog-nosed skunk,

and ocelot. Smaller herbivores include Mexican ground squirrel, Texas pocket gopher, and southern plains woodrat. Bats typical of this Section include the ghost-faced and Sanborn's long-nosed. Bison, jaguar, and jaguarundi are historically associated with this Section. This Section and adjacent 315E form the northern range of a number of birds common to Mexico and South America. Typical birds include chachalaca, green kingfisher, pauraque, elf owl, white-winged dove, red-billed pigeon, black-headed oriole, kiskadee flycatcher, yellow-green vireo, Lichtenstein's oriole, tropical kingbird, beardless flycatcher, buff-bellied hummingbird, green jay, long-billed thrasher, and white-collared seedeater. Amphibians include Mexican burrowing toad, Rio Grande leopard frog, sheep frog, giant toad, spotted chorus frog, Mexican tree frog, Rio Grande chirping frog, and Berlandier's tortoise. Reptiles include Texas banded gecko, reticulate collared lizard, spot-tailed earless lizard, keeled earless lizard, blue spring lizard, mesquite lizard, rose-bellied lizard, Laredo striped whiptail, black-striped snake, indigo snake, speckled racer, and cat-eyed snake.

Climate. Precipitation ranges from 17 to 30 in (420 to 750 mm), decreasing from east to west and occurring mostly during May and June. Temperature averages 70 to 72 °F (21 to 22 °C). The growing season lasts 260 to 310 days.

Surface Water Characteristics. A sparse density of small to medium intermittent streams is present in a dendritic drainage pattern. Major rivers include the Rio Grande and Nueces.

Disturbance Regimes. Drought has probably been the principal historical disturbance.

Land Use. Natural vegetation has been converted to dry-land pasture for cattle grazing on about 90 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Section 315F—Southern Gulf Prairies and Marshes

Geomorphology. This Section is in the Coastal Plains geomorphic province. The predominant landform consists of a flat, weakly dissected alluvial plain formed by deposition of continental sediments onto a submerged, shallow continental shelf, which was later exposed by sea level subsidence. Along the coast, fluvial deposition and shore-zone processes are active in developing and maintaining beaches, swamps, and mud flats. Elevation ranges from sea level to 160 ft (0 to 50 m). Local relief ranges from 0 to 50 ft (0 to 18 m).

Lithology and Stratigraphy. Rock units formed during the Cenozoic Era. These strata consist of Quaternary marine deposits of non-glacial sand, silt, and clay.

Soil Taxa. Soils are Aquepts, Aqualls, Aquolls, and Aquepts. Psammaquepts, Udipsammaquepts, Fluvaquepts, and Salorthids are on barrier islands and long bays. Haplaquolls, Natraqualls, Pelluderts, and Pellusterts are on low coastal terraces. Ochraqualfs, Albaqualls, and Paleudalfs are found on plains. Haplaquolls, Haplaquepts, and Fluvaquepts are on coastal flats and flood plains. These soils have a hyperthermic and thermic temperature regime, an aquic moisture regime, and montmorillonitic, mixed, or siliceous mineralogy. Soils are fine to coarse textured, saline, and mostly poorly drained with high water tables.

Potential Natural Vegetation. Küchler classified vegetation as bluestem-sacahuista prairie and southern cordgrass prairie. The predominant vegetation form is tall grassland with little tree cover. Grasslands dominate areas inland from the coast and consist of little bluestem, indiangrass, switchgrass, and big bluestem. Occasional areas of live oak are present. Poorly drained areas along the coast support freshwater and saltwater marsh vegetation of sedges, rushes, saltgrass, and cordgrass.

Fauna. The faunal communities typically include coyote, ringtail, hog-nosed skunk, ocelot, and collared peccary. Smaller mammals include Mexican ground squirrel, Texas pocket mouse, northern pygmy mouse, and southern Plains woodrat. Birds of freshwater marshes, lakes, ponds, and rivers include reddish egret, white-faced ibis, black-billed whistling duck, white-fronted goose, and oliveaceous cormorant. Reptiles and amphibians include eastern spadefoot toad, Gulf coast toad, American alligator, diamondback terrapin, spiny-tailed iguana, Texas horned lizard, Texas spotted whiptail, and indigo snake.

Climate. Precipitation ranges from 25 to 55 in (620 to 1,400 mm). Temperature averages 68 to 70 °F (20 to 21 °C). The growing season lasts 280 to 320 days.

Surface Water Characteristics. A low density of small to medium perennial streams is present in this Section. The water table is high in many areas, resulting in poor natural drainage and abundance of wetlands. A poorly defined drainage pattern has developed on very young alluvial plains. There is an abundance of palustrine systems with seasonally high water levels. This Section adjoins the West Indian Marine and Estuarine Provinces.

Disturbance Regimes. Ocean tides and grazing have probably been the principal historical disturbance. Climatic influences include occasional hurricanes.

Land Use. Natural vegetation has been changed for agricultural crops on about 40 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Surface Water Characteristics. This Section is the primary watershed for much of Arizona and western New Mexico. Several large streams are perennial. Much of the water is stored in reservoirs, and small artificial lakes are common. Ground water is limited and usually occurs at great depths.

Disturbance Regimes. Natural fires occurred in ponderosa pine about every 3 to 10 years, but have been prevented recently. This has led to a higher canopy cover and increased fuel loads, resulting in a less resilient ecosystem and increased hazard of wildfire. Much of this area is covered with timber, with rangeland and recreation being secondary uses.

Land Use. Reserved.

Cultural Ecology. This diverse Section encompasses primarily the mountainous ponderosa pine and transition zones of central Arizona and western New Mexico. Human groups have utilized this Section's well-watered upland valleys and meadows, high mesas, and more sparsely forested basins and ranges for the full extent of human prehistory in the Southwest. Paleo-Indian and Archaic peoples utilized the mountains seasonally for hunting and gathering, as did later populations. Early agriculturalists made use of a wide variety of settings, including upland valleys, for their pithouse villages and planting areas. In later times, settlements concentrated more in the bottomlands of major drainages, but shifts to higher elevations occurred at various times and in various places in response to climatic fluctuations, population growth, and defensive concerns. The uplands include manifestations of a wide range of cultural traditions, including the Sinagua, Mogollon, Mimbres, and eastern and western Anasazi. By the mid-1300's, however, most of the area was abandoned as permanent or seasonal settlements. Sometime around or before the Spanish entrada into the Southwest, Athabaskan speakers made their appearance; Apache and Navajo continued to use the mountains for sustenance and for refuge well into the 19th century.

Spanish and Mexican use of most mountain areas was limited due to the presence of Apache and Navajo. In New Mexico, the Jemez Mountains were used by both Pueblos and Hispanic villagers for hunting, grazing, and fuel wood gathering in Colonial times. The discovery of mineral resources in the mid-1800's greatly increased American interest in the mountains, and military campaigns eventually removed the Apache and Navajo to reservations. The coming of the railroads in the 1890's made large-scale logging possible, especially evident in the White Mountains and Zuni Mountains. Ranching, mining, and logging were important pursuits in the early part of the 20th century, and continue today. Recreation and wilderness values are equally important on public lands. The mountains, particularly peaks like the San Francisco Peaks and Mt. Taylor, hold special cultural and religious significance for many contemporary Pueblos and tribes who continue to use the mountains for economic and

religious purposes, as well as Acoma, Laguna, Jemez, and Zia pueblos.

Section M313B-Sacramento-Manzano Mountain

Geomorphology. This Section is in the Basin and Range physiographic province; it is located in central and south-central New Mexico. Major landforms are mountains, hills, plains, and scarps. Major landform features are the Sacramento, Manzano and Sandia Mountains and the Canadian Escarpment. Elevation ranges from 6,000 to 11,000 ft (2,130 to 3,690 m).

Lithology and Stratigraphy. There are Paleozoic sedimentary and Cenozoic aged igneous rocks and a few metamorphic rocks.

Soil Taxa. Soils include Eutroborals, Glossoborals, Dystrochrepts, Ustochrepts, Argiustolls, Calciustolls, Haplustolls, and Ustorthents with mesic and frigid temperature regimes and ustic and udic soil moisture regimes. A few Cryoborals and Cryochrepts occur with cryic soil temperature regimes and udic soil moisture regimes.

Potential Natural Vegetation. Vegetation consists of ponderosa pine in frigid soil temperature regimes and ustic and udic soil moisture regimes, Douglas-Fir in frigid-udic regimes, pinyon-juniper in mesic-ustic regimes, and Engelmann spruce, and subalpine fir in cryic-udic regimes. A few areas support grey oak at the lowest elevations.

Fauna. Reserved.

Climate. Precipitation ranges from 12 to 35 in (305 to 900 mm), with less than half of the precipitation falling during the winter. Temperature averages 40 to 57 °F (4 to 8 °C); winter temperatures vary throughout this Section. The growing season lasts less than 70 to 170 days.

Surface Water Characteristics. This Section supplies much of the water to the Rio Grande and Pecos Valley basins. Several streams are perennial.

Disturbance Regimes. Natural fire regime averages 3 to 10 years of frequency in ponderosa pine forests. Much of this area is covered with timber, with some areas of commercial quality. Another use of land is as range.

Land Use. Reserved.

Cultural Ecology. The earliest human occupation of the Sacramento-Manzano Mountain Section was characterized by an emphasis on big game hunting supplemented with gathering wild plant foods. Evidence for these activities is primarily restricted to the lower elevations and the base of the mountains. Around 6000

B.C., a gradual climate change from cooler and wetter to drier conditions resulted in a change of subsistence patterns. Highly mobile populations hunted and gathered a variety of resources throughout the region. The pinon-juniper zone was intensely exploited for both hunting and gathering. The mixed conifer forests were utilized to some extent for hunting and religious purposes, but the climate and scarcity of resources resulted in only sporadic use. As agriculture became important during the past 2000 years, most of the inhabitants became more sedentary and populations increased. Villages tended to be located close to water in the pinon-juniper woodland and lower alluvial fans at the base of the mountains. Athabascan groups entered the area sometime before the 1600's, utilizing many of the same resources; by the mid 1700's, Comanches occupied the plains immediately to the east. Today, Native Americans continue to use the mountains for gathering and ceremonial purposes.

The earliest historic settlement began in the late 1500's with the Spaniards. A few villages were established in the foothills of the Manzanos, Sandias, and near the headwaters of the Canadian and Pecos Rivers, but

the Apaches kept most European settlers out of the Sacramentos and mountain ranges to the south. These settlers concentrated on the pinon-juniper woodlands and grasslands for hunting, fuel wood gathering, post cutting, and small subsistence farming. Beginning in the late 1800's, discoveries of gold and an increase in European settlement throughout the mountains resulted in more intensive use of the higher elevations for mining, logging, and ranching activities. Most of the homesteads and villages were located in the larger valleys or on the eastern slopes of the mountains near permanent water sources. By the turn of the century, logging dominated the activities in the mixed conifer zone, with ranching still playing an important role throughout the mountains. Currently, the area continues to consist primarily of small rural communities, with logging, fuel wood gathering, ranching, hunting, and recreation as the primary subsistence base. Anglo, Hispanic, and Mescalero Apache cultures are present. Recreational use has increased dramatically over the past few decades, particularly near the larger cities.

Compiled by Southwestern Region.

Province 321—Chihuahuan Semi-Desert

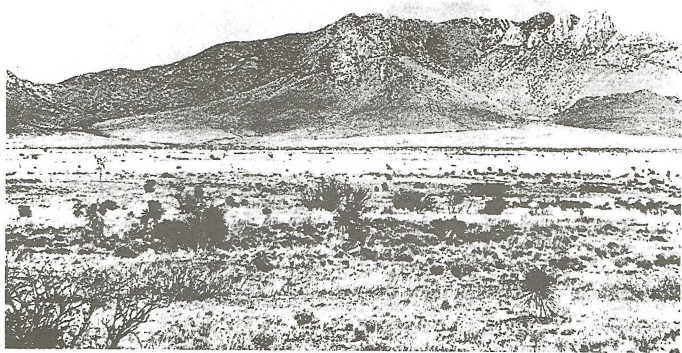
Two Sections have been delineated in this Province: 321A—Basin and Range; and 321B—Stockton Plateau. These Sections are located in the southwestern conterminous States, including parts of Arizona, New Mexico, and Texas. The area of these Sections is about 85,200 mi² (220,700 km²).

Section 321A—Basin and Range

Geomorphology. This area, which is in the Basin and Range physiographic province, is located in southeast Arizona and southwest and central New Mexico. Relatively recent episodes of continental rifting, volcanism, erosion, and sedimentation have dominated this Section. Oligocene faulting created the Rio Grande rift in New Mexico and west Texas and initiated volcanism. Subsequent Miocene composite volcanoes emitted silicic lava and ash. Along with Pliocene and Pleistocene mass wasting and cyclic erosion events, and associated with glacial cycles farther north, this combination of processes gradually filled the basins with deep sediments from adjacent mountain ranges. Current erosion cycles dissect these deposits and continue to modify the rift valley

through transport and deposition processes. Various landforms comprise about equal areas: (1) plains with low mountains consisting of 50 to 80 percent of gently sloping area and local relief of 1,000 to 3,000 ft (300 to 900 m); (2) plains with high hills where relief is 1,000 to 3,000 ft (300 to 900 m); (3) open high hills with relief of 500 to 1,000 ft (150 to 300 m); and (4) tablelands with moderate relief averaging 100 to 300 ft (30 to 90 m). Elevation ranges from 2,600 to 5,500 ft (800 to 1676 m).

Lithology and Stratigraphy. Geologic strata consist of an undifferentiated mixture of Quaternary marine deposits, Miocene volcanic rocks, lower Tertiary volcanic rocks, and Lower Cretaceous marine deposits; Permian marine deposits of Ochoan and Guadalupian series; Paleocene continental deposits; Upper Cretaceous marine deposits; Precambrian plutonic and intrusive granitic rocks; Quaternary volcanic rocks; Permian continental deposits of Wolfcampian age, and Miocene felsic volcanic rocks; upper Paleozoic marine deposits; Precambrian sedimentary rocks of Pahrump and Unkar groups; Precambrian Mazatzal quartzite, Yavapai series, pinal schist, and metavolcanic formations.



The Chihuahuan Desert in the Basin and Range Section of southeastern Arizona.

Soil Taxa. Types are mostly Torriorthents with Calciorthids, Haplargids, and some Alfisols (10 percent) and Mollisols (10 percent) with a thermic temperature regime, an aridic moisture regime, and mixed or carbonatic mineralogy.

Potential Natural Vegetation. Küchler mapped vegetation as trans-Pecos shrub savanna (*Flourensia-Larrea*); grama-tobosa desert grasslands; oak-juniper woodland; and mesquite-tarbrush desert scrub.

Fauna. Reserved.

Climate. Precipitation ranges from 8 to 13 in (200 to 320 mm); it occurs mostly during July and August. Temperature ranges from 55 to 70 °F (13 to 20 °C) and winters are mild. The growing season lasts 200 to 240 days.

Surface Water Characteristics. There is a low density of intermittent streams and very few associated rivers, most of which originate in distant mountainous areas. Flow rates are low to moderate, except during periods of heavy rain, when large amounts of surface runoff can occur. Dendritic drainage pattern has developed on dissected mountain slopes, largely without bedrock structural control. Playa lakes are common following periods of rains, but are ephemeral in the hot, dry climate prevalent in this Section.

Disturbance Regimes. Drought has probably been the principal historical source of disturbance.

Land Use. Land use includes range for cattle grazing on about 90 percent of the area.

Cultural Ecology. The Basin and Range Section is a physiographically diverse area characterized by expansive playas and open grassland basins cut by steep, rugged mountain, mesa, and canyon terrain. Humans have been utilizing the area for 8,000 to 10,000 years, although evidence of occupation prior to 7,000 B.C. remains scarce and scattered. Paleo-Indian materials are especially prevalent, however, from the foothills of the Tularosa Mountains. The area was widely utilized by Cochise and Oshara Tradition Archaic populations between 7,000 B.C. and 200 A.D. Site distribution points to a highly mobile hunting and gathering nomadic subsistence pattern initially, followed by use of increasingly smaller areas and a seasonal cycle of upland and lowland exploitation. Puebloan use and occupation were most prevalent between 200 and 1150 A.D. in the south and 200 and 1400 A.D. in the north. Southern basin, range, and mountain areas supported the Mogollon culture, while more northern mountain areas also included the southern fringe of the Anasazi tradition. Puebloan settlement reflected gradual movement toward major drainages and waterways over time. Basin and range deserts were widely used for wild plant procurement, agriculture, and settlement.

References to the Apache appear in 16th century Spanish documents and later historic accounts. Spanish expeditions passed through the area, but major settlements were restricted to the Rio Grande and the area east of the Mogollon and Tularosa Mountains. Livestock ranching and mining gained prominence in the 1800's. Gold, silver, copper, and turquoise were mined in the Mogollon, Burro, and Black Range Mountains of New Mexico. Introduction of the railroad in the 1800's witnessed an influx of European settlement along the Rio Grande, the southern Burro Mountains (Deming, Lordsburg, and Silver City, New Mexico) and more northern reaches of the Mogollon Mountains. In more northern, remote mountain areas, small ranching, mining, and timber-related settlements were established along major rivers and ephemeral drainages. Ranching and tourism flourish in the area today, and both Anglo and Hispanic cultures influence contemporary life.

Compiled by Southwestern Region.

Section 321B-Stockton Plateau

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform consists of open high hills with smaller areas of tablelands. These landform were formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, which was followed by sheet erosion and transport. These processes resulted in a region of shallow dissection. Elevation ranges from 2,600 to 4,500 ft (800 to 1,300 m). Local relief in most of the Section ranges from 500 to 1,000 ft. Relief in a small area of tablelands ranges from 300 to 500 ft.

Lithology and Stratigraphy. Rocks were formed during Paleozoic (35 percent), Mesozoic (40 percent), and Cenozoic (25 percent) Eras. Paleozoic strata consist of Pennsylvanian marine deposits. Mesozoic strata consist of nondifferentiated mixture of Lower and Upper Cretaceous marine deposits (limestone, and sandstone). Cenozoic strata consist of lower Tertiary volcanic rocks of high alkalic content.

Soil Taxa. Soils are Argids and Orthids. Haplargids, Paleargids, and Calciorthids are on uplands, piedmont plains, and dissected terraces. Calciorthids, Ustolls, and Torriorthents are on uplands with shallow depths to bedrock. Paleorthids are on mesas and terraces. Gypsiorthids are in closed basins. Natragids and Torrients are on basin floors. Torrifluvents are on flood plains and Torripsamments are on sandy uplands. These soils have a thermic temperature regime, aridic moisture regime, and mixed or carbonatic mineralogy. Soils are well drained, shallow to deep, and medium textured. Soil moisture is limited for use by vegetation during most of the growing season.

Potential Natural Vegetation. Küchler classified vegetation as trans-Pecos shrub savanna (*Flourensia-Larrea*); with juniper and redcedar woodlands. The

predominant vegetation form is short to mid height grasslands with sparse cover of drought-deciduous and scale-leaved shrubs and small trees. Species include desert shrubs in association with short to mid height grasses and oak savannas.

Fauna. Typical large to medium size herbivores and carnivores include pronghorn, coyote, swift fox, ringtail, hooded skunk, ocelot, and collared peccary. Smaller herbivores include desert shrew, desert cottontail, Mexican ground squirrel, yellow-faced pocket gopher, Nelson's pocket mouse, and Merriam's kangaroo rat. Several bats, western mastiff and yuma myotis, are present here. Birds of grasslands include bronzed cowbird, Baird's sparrow, and white-necked raven. Birds of thickets include black-capped vireo, scaled quail, Harris' hawk, Inca dove, cave swallow, golden-fronted woodpecker, and pyrrhuloxia. Amphibians include Couche's spadefoot toad, western spadefoot toad, Rio Grande leopard frog, Great Plains toad, red-spotted toad, spotted chirping frog, and Mexican mud turtle. Reptiles include Texas banded gecko, Big Bend gecko, desert spring lizard, canyon lizard, crevice spiny lizard, gray checkered whiptail, little striped whiptail, plateau spotted whiptail, checkered whiptail, Texas-Pecos rat snake, gray-banded kingsnake, Big Bend patch-nosed snake, Mexican black-nosed snake, Big Bend

black-headed snake, rock rattlesnake, and black-tailed rattlesnake.

Climate. Precipitation ranges from 8 to 13 in (200 to 320 mm). Temperature ranges from 55 to 64 °F (13 to 18 °C). The growing season lasts 200 to 240 days.

Surface Water Characteristics. This Section has a low density of intermittent streams that originate in nearby mountainous areas and flow mainly following rains. Major river systems include the Rio Grande and Big Canyon. Flow rates are low except during periods of heavy rain, when large amounts of surface runoff can occur. Dendritic drainage pattern has developed. Playa-type lakes are present following rains but quickly dry up, leaving high salt concentrations.

Disturbance Regimes. Drought and flash floods are the principal types of natural disturbance.

Land Use. Reserved.

Cultural Ecology. Reserved.

Compiled by Southern Region.

Province 331—Great Plains-Palouse Dry Steppe

Ten Sections have been delineated in this Province: 331A—Palouse Prairie; 331B—Southern High Plains; 331C—Central High Tablelands; 331D—Northwestern Glaciated Plains; 331E—Northern Glaciated Plains; 331F—Northwestern Great Plains; 331G—Powder River Basin; 331H—Central High Plains; 331I—Arkansas Tablelands; and 331J—Northern Rio Grande Basin. These Sections are located in the north-central conterminous States, including parts of Oklahoma, Kansas, Colorado, Nebraska, Wyoming, South and North Dakota, and Montana. The area of these Sections is about 290,700 mi² (752,900 km²).

Section 331A—Palouse Prairie

Geomorphology. This Section comprises moderately to strongly dissected loess-covered basalt plains, hills with large steep toes, undulating plateaus, and some river breaklands. Mountains occur in the southeast part of the Section. This Section is within the Columbia Plateau physiographic province. Elevation ranges from 1,200 to 6,000 ft (366 to 1,830 m).

Lithology and Stratigraphy. There is Tertiary basalt with some Paleozoic granitic and metasedimentary outcrops in breaklands. Granitoid rocks of the Blue Mountain uplift are evident, as well as sedimentary rocks which occur at the boundaries of the flood basalt deposits.

Soil Taxa. Soils include mesic Xerolls with some Kerals, Albolls, and Aquolls. These soils are generally deep, loamy to silty, and have formed in loess, alluvium, or glacial outwash. Soils in mountainous areas are shallower and contain rock fragments.

Potential Natural Vegetation. Grasslands and meadow-steppe vegetation dominated by grasses are the prototypical vegetation of the Palouse. Woodlands and forests occur in the eastern portion of the Section on hills and low mountains. The relatively arid western portion of the Section is dominated by grassland, where bluebunch wheatgrass and Idaho fescue are the most prominent. Meadow-steppe vegetation characterized by Idaho fescue and common snowberry dominates areas with more precipitation, but still too dry to support forest vegetation on deep loamy soils. Most of this meadow-steppe as well as the grassland to the west, has been converted to crop lands. Ponderosa pine woodlands and forests form the lower timberline in the eastern portion of the Section on hills and low mountains. The transition zone between forest and meadow-steppe consists of a complex interfingering between these two vegetation types. Douglas-fir series forests dominate at higher elevations in the mountainous areas of the Section.

mountains and Grand Plateau area on sheltered north slopes in the mountains.

Fauna. Birds are typical of grasslands with intermittent riparian systems and pine hills. Grassland species include American kestrel, ring-necked pheasant, upland sandpiper, western kingbird, horned lark, black-billed magpie, western meadowlark, and savanna sparrow. Riparian system species include Lewis' woodpecker, gray catbird, western bluebird, orange-crowned warbler, northern oriole, black-headed grosbeak, and lazuli bunting. Birds which reach or nearly reach the extent of their range include mountain quail, barn owl, white-headed woodpecker, eastern kingbird, and American redstart. The bald eagle, an endangered species, also occurs around larger water bodies. Typical herbivores and carnivores include white-tail deer, mule deer, and bobcat. Smaller common herbivores include the blacktail jackrabbit and Washington ground squirrel. Rare species include the whitetail jackrabbit, and possibly the pygmy rabbit. Herpetofauna typical of this Section are the bullfrog, painted turtle, western fence lizard, and the northern Pacific rattlesnake.

Climate. Precipitation ranges from 10 to 30 in (250 to 760 mm), evenly distributed throughout fall, winter, and spring. Winter precipitation is mostly snow; summers are relatively dry. Climate is warm temperate with a maritime influence. Temperature averages 45 to 54 °F (7 to 12 °C). The growing season lasts 100 to 170 days.

Surface Water Characteristics. There are scattered coulees and deeply-incised major drainages. Loess plains have low to medium density dendritic drainage patterns. Rapid changes in runoff volumes are possible on basalt due to gain or loss of water to gravel interbeds. The Snake River flows through this Section.

Disturbance Regimes. Wind is the principal source of natural disturbance.

Land Use. Dry farming and livestock grazing occurs on about 90 percent of the area.

Cultural Ecology. Reserved.

Compiled by Northern Region

Section 331B—Southern High Plains

Geomorphology. This Section is in the Great Plains geomorphic province. The predominant landform is a broad, extensive flat plain formed by fluvial sedimentation of continental erosional products from adjacent mountain ranges, followed by sheet erosion and transport. These



Southern High Plains Section.

processes resulted in a region of moderate dissection. Landforms consist mostly of smooth plains with smaller areas of tablelands. Elevation ranges from 2,600 to 4,000 ft (800 to 1,200 m). Local relief ranges mainly from 100 to 300 ft (90 m). A small area of tablelands is present where relief ranges from 300 to 500 ft (90 to 150 m).

Lithology and Stratigraphy. Rocks were formed during the Paleozoic (20 percent), Mesozoic (20 percent), and Cenozoic (60 percent) Eras. Paleozoic strata consist of Permian marine deposits (shale and limestone). Mesozoic strata consists of Upper Cretaceous marine deposits (limestone and sandstone). Cenozoic strata consists of Quaternary continental deposits (poorly consolidated silt, sand, and gravel in varying proportions) and other localized marine deposits.

Soil Taxa. Soils are Ustolls and Ustalfs. Paleustolls, Argiustolls, Paleustalfs, and Haplustalfs are on uplands. Calciustolls, Haplustolls, and Paleustolls are on ridges and steeper slopes. Haplustolls occur on young valley floors. Pellusterts are in clayey playa lake basins. Calciorthis, Paleorthis, and Torriorthents are steep slopes in breaks. These soils have a mesic or thermic temperature regime, an ustic moisture regime, and mixed or carbonatic mineralogy. Soils are deep, fine to coarse textured, well drained, and have limited soil moisture for use by vegetation during parts of the growing season.

Potential Natural Vegetation. Küchler classified vegetation as sand sage-bluestem prairie and bluestem-grama prairie. The predominant vegetation form is short to mid-height grasslands. Species composition includes bluegrama, buffalograss, hairy grama, and little bluestem.

Fauna. Large to medium size herbivores and carnivores typical of this Section include pronghorn, coyote, and ringtail. Smaller herbivores include desert shrew, black-tailed prairie dog, Plains pocket mouse, silky pocket mouse, and hispid pocket mouse. Bison and black-footed ferret are historically associated with this Section. Birds of grasslands include lesser prairie chicken, Swainson's hawk, and burrowing owl. Typical reptiles and amphibians include Great Plains toad, red spotted toad, lesser earless lizard, round-tailed horned lizard, Great Plains skink, and Plains black-headed snake.

Climate. Annual precipitation averages 16 to 20 in (400 to 520 mm). Between 16 to 35 in (400 to 900 mm) of snow occurs. Temperature ranges from 50 to 57 °F (10 to 14 °C). The growing season lasts 140 to 185 days.

Surface Water Characteristics. There is a low density of small intermittent streams with low volume of water flowing at low velocity. A dendritic drainage pattern has developed on a weakly dissected plateau, largely without bedrock structural control. Major rivers include the Cimarron and North Canadian.

Disturbance Regimes. Reserved.

Land Use. Natural vegetation has been converted to agricultural crops and range for cattle grazing on about 90 percent of the area.

Cultural Ecology. Reserved.

Compiled by Southern Region and Southeastern Forest Experiment Station.

~~Section 2040 Central High Tablelands~~

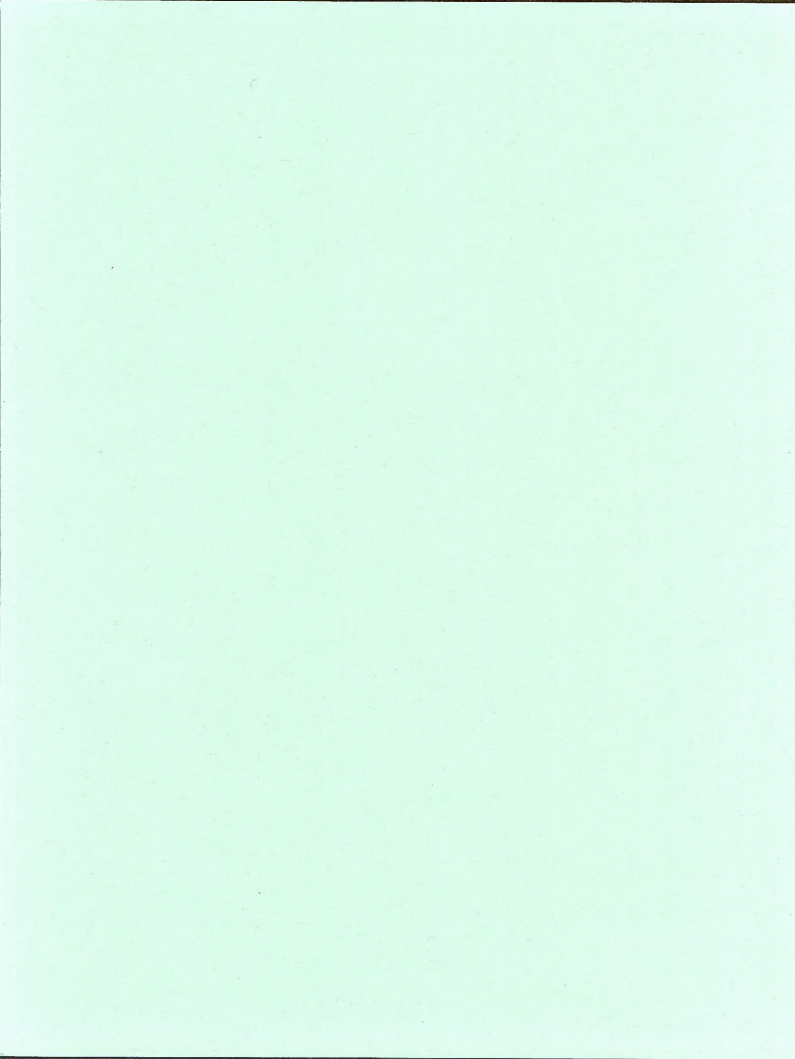
Geomorphology. This Section includes broad intervalley remnants of smooth fluviatile plains. Smooth loess-mantled tablelands with gently rolling slopes and major valleys are bordered by steep slopes. Broad, level flood plains and terraces occur on major rivers and streams. This Section is in Fenneman and Johnson's Great Plains geomorphic physical division. Elevation ranges from 2,625 to 3,950 ft (800 to 1,200 m).

Lithology and Stratigraphy. The Colorado part of the Section is Tertiary sandstones, siltstones, and conglomerates and Quaternary windblown dune sands and loess, with Cretaceous marine shales and Quaternary alluvium in the major drainages. The Nebraska and Kansas part of the Section is mostly Quaternary windblown dune sands and loess, some Tertiary sandstones, shales, and conglomerates, and Cretaceous shales and limestones with Quaternary alluvium in stream valleys.

APPENDIX 2

TEXAS OIL AND GAS LEASE OPERATIONS

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WELL LOCATION	A2-1
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LEASE OPERATIONS

ACQUIRING A FEDERAL OIL AND GAS LEASE

A Federal lease may be acquired by either competitive leasing or over the counter leasing. The competitive leasing process is the offering of Federal oil and gas leases at an oral auction. These auctions are held quarterly. The noncompetitive leasing process is an over-the-counter leasing of Federal lands not leased at the competitive lease auctions. A competitive lease has a term of 5 years (unless held by production) and a noncompetitive lease has a term of 10 years (unless held by production).

Application of lease stipulations that will mitigate the effect of oil and gas operations on other resources are applied by either the Bureau of Land Management (BLM) or other agencies. Stipulations on acreage with non-Federal surface over Federal minerals are also applied by the BLM.

DECIDING ON LOCATION OF WELL

A geologist for an exploration company examines well logs, seismic data and any other available information to determine an area for possible accumulation of hydrocarbons. Geologists, engineers and other exploration experts then determine the best location for a proposed well.

The surface location for the well is based upon geological evidence and surface conditions. A normal drill pad covers one to several acres. The estimated average size of a drill pad for the purpose of the Texas RMP is 3.4 acres. Access and surface conditions (creeks, ponds, timber and structures) should be taken into consideration in selecting the location and the pad area should be as level as possible. Creating the least possible surface disturbances and safety procedures are other factors to be considered in location selection.

Once the location of the proposed well has been determined the well location needs to be staked (surveyed). The BLM is notified of a proposed well location on Federal minerals by a notice of staking or an Application for Permit to Drill (APD). An approved APD must be issued and in hand prior to any surface disturbance or drilling activities.

ACQUIRING AN APPROVED APPLICATION FOR PERMIT TO DRILL (APD)

To acquire an approved APD the following three items are required: (1) drilling plan approved, (2) an environmental assessment conducted and (3) bonding requirements met. These are the minimum requirements and special stipulations may be added.

1. Drilling Plan

A drilling plan must be attached to the APD. This drilling plan must contain a description of the drilling program and surface use program. The drilling program shall include a description of the pressure control system and circulation mediums, the testing, logging and coring program, pertinent geologic data and information on expected problems and hazards. The surface use program shall contain a description of the road and drill pad location and construction methods for containment and disposal of waste materials, plans for reclamation of the surface and other pertinent data required. A drawing showing the proposed layout of the drilling location is also included within the APD. The drilling plan is the proposed action addressed in the Environmental Assessment (EA).

2. Environmental Assessment

To approve an APD an environmental assessment must be made of the proposed action. The EA process involves both site specific resource inventory and resource evaluations and analysis as well as an estimate of any cumulative resource impacts.

The proposed action is reviewed and a checklist is sent to the operator requesting any absent information that is needed to complete the EA. A BLM environmental protection specialist will inspect the proposed drilling location with the operator's agent, dirt contractor and a representative of the affected Surface Management Agency (SMA) prior to completion of the EA. On split-estate lands the BLM is considered the Federal SMA.

After the proposed drilling location inspection, the SMA will advise the BLM if any additional conditions of approval are required. These additional conditions could include surface restorations, reseeding or other reclamation work, requirements to avoid sensitive locations or restricted time periods.

Included in the EA process are cultural evaluation and threatened and endangered (T/E) species evaluation of the proposed well location by both a BLM archeologist and a wildlife biologist. Wetlands (riparian areas), floodplains, soil permeability, water quality and any special circumstances are also evaluated. The cultural evaluation involves contacting the State Historic Preservation Office (SHPO) and any other agency involved in the preservation of historic or prehistoric sites. The T/E species evaluation involves contacting the state wildlife department, the state natural heritage program and/or the U.S. Fish and Wildlife Service. Each agency receives a 30-day time period for review and comment. The BLM personnel or an authorized private contractor (hired by the oil & gas operator) will, upon request, conduct an on-foot location inventory of the proposed well location.

If after completion of the EA, a Finding Of No Significant Impact (FONSI) is determined, the EA is attached to the APD. If the EA indicates the potential for significant impacts to the human environment, the APD is either rejected or an Environmental Impact Statement (EIS) will be prepared to further analyze the proposed action.

3. Bonding

The lessee or the operator must furnish a bond (minimum amount \$10,000) before any surface disturbing activities related to drilling can begin. The bond requirement is to ensure compliance with all the lease terms and stipulations as well as the conditions of approval contained in the EA. If there is a change of operator, the new operator must state the bond under which they will operate. Bonds are not released until all the terms and conditions of the lease and APD have been met.

An approved APD with copies of regulations, lease stipulations, the EA and conditions of approval is issued by the BLM to the lessee or the designated operator. The APD approval expires one year after the approval date. A time extension may be request if conditions warrant. Such an extension is subject to BLM approval.

SPODDING AND DRILLING THE WELL

The operator must phone in a spud report to the BLM District Office within one working day of the spud date (date actual drilling of the well begins). At each well there shall be a well sign identifying the operator, lease number, location, and well name. The operator must submit daily drilling reports while drilling and

completing the well. A copy of the approved APD must be at the well site during drilling.

COMPLETING THE WELL

Once the well is completed, a Well Completion or Recompletion Report and Log (Form 3160-4) must be submitted within 30 days to the BLM District Office. If the well is a dry hole, the operator may get oral permission to plug and abandon the well. Oral permission must be followed with written confirmation.

PRODUCING THE WELL

Once the well is completed as a producing well, the operator must submit within 5 working days, a 5-day start-up notice. If the report is submitted by telephone, it must be followed by written notice within the 5-day time period. After a well is completed and production equipment is in place the well location is normally an area of approximately 1/2 to 1 acre.

MONTHLY REPORTS

While producing, the operator must submit a Monthly Report of Operations (MRO). This report lists the production for the well. Each well location is inspected on a regular basis for compliance with Federal regulations and stipulations. If any violations are found a report of Incident of Noncompliance (INC) is written and this report is sent to the operator with instruction to correct the violation within a certain time frame.

UNDESIRABLE EVENTS

All undesirable events will be reported to the BLM immediately. Undesirable events include, but are not limited to, oil spills, salt water spills, theft, fires, leaks, accidents or other unusual occurrences.

CHANGE OF OPERATIONS

Once producing, any operation at the well location that creates additional surface disturbance or effects a change in the well bore status requires a notice of intent be submitted on the Sundry Notices and Reports on Wells (Form 3160-5). Before any work is commenced, the change must be approved with any necessary modifications and/or additions to conform to Federal regulations. For changes that create additional surface disturbance not analyzed or included in the original APD, an EA is required.

Any change in lessee of record must be approved by BLM prior to the new lessee operating the well. Until the assignment of interest to the new (succeeding) lessee is approved the lessee of record remains responsible for all activities pertaining to the lease.

ABANDONING/RECLAIMING THE WELL LOCATION

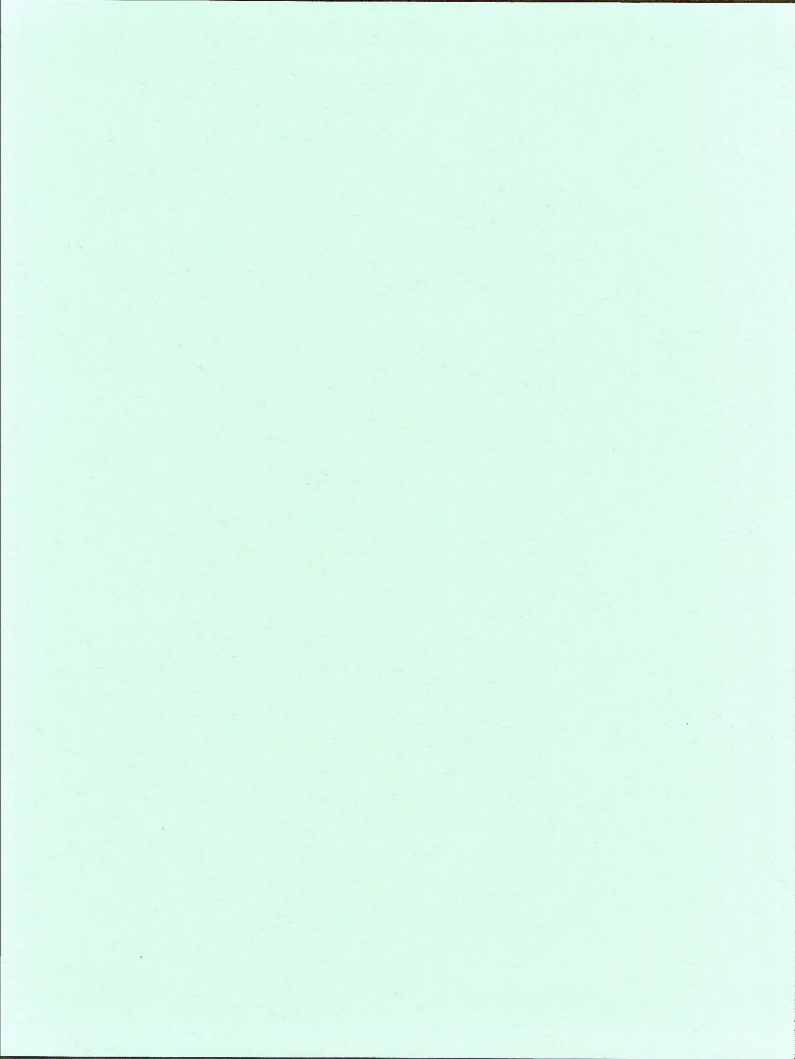
No well may be abandoned without prior approval by the BLM. If a well is no longer profitable to produce, an operator may wish to plug and abandon the well. In order to plug a well, an operator must submit, on a Sundry Notice (Form 3160-5), his intent to plug the well. For old wells not having an approved abandonment plan, a sketch showing the disturbed area and roads to be abandoned, along with the proposed reclamation measures, shall be submitted with the Form 3160-5. A BLM oil and gas inspector must witness all pluggings and an environmental protection specialist will evaluate reclamation efforts. Final abandonment is not approved until the surface reclamation work required by the approved APD or approved abandonment notice has been completed satisfactorily.



APPENDIX 3

TEXAS OIL AND GAS LEASE STIPULATIONS

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SPECIAL STIPULATION - BUREAU OF RECLAMATION

To avoid interference with recreation development and/or impacts to fish and wildlife habitat and to assist in preventing damage to any Bureau of Reclamation dams, reservoirs, canals, ditches, laterals, tunnels, and related facilities, and contamination of the water supply therein, the lessee agrees that the following conditions shall apply to all exploration and developmental activities and other operation of the works thereafter on lands covered by this lease:

1. Prior to commencement of any surface-disturbing work including drilling, access road work, and well location construction, a surface use and operations plan will be filed with the appropriate officials. A copy of this plan will be furnished to the Regional Director, Great Plains Region, Bureau of Reclamation, P.O. Box 36900, Billings, MT 59107-6900, for review and consent prior to approval of the plan. Such approval will be conditioned on reasonable requirements needed to prevent soil erosion, water pollution, and unnecessary damages to the surface vegetation and other resources, including cultural resources, of the United States, its lessees, permittees, or licensees, and to provide for the restoration of the land surface and vegetation. The plan shall contain provisions as the Bureau of Reclamation may deem necessary to maintain proper management of the water, recreation, lands, structures, and resources, including cultural resources, within the prospecting, drilling, or construction area.

Drilling sites for all wells and associated investigations such as seismograph work shall be included in the above-mentioned surface use and operation plan.

If later explorations require departure from or additions to the approved plan, these revisions or amendments, together with a justification statement for proposed revisions, will be submitted for approval to the Regional Director, Great Plains Region, Bureau of Reclamation, or his authorized representative.

Any operations conducted in advance of approval of an original, revised, or amended prospecting plan, or which are not in accordance with an approved plan, constitute a violation of the terms of this lease. The Bureau of Reclamation reserves the right to close down operations until such corrective action, as is deemed necessary, is taken by the lessee.

2. No occupancy of the surface of the following excluded areas is authorized by this lease. It is understood and agreed that the use of these areas for Bureau of Reclamation purposes is superior to any other use. The following restrictions apply only to mineral tracts located within the boundary of Bureau of Reclamation project where the United States owns 100 percent of the fee mineral interest.

- a. Within 500 feet on either side of the centerline of any and all roads or highways within the leased area.
- b. Within 200 feet on either side of the centerline of any and all trails within the leased area.
- c. Within 500 feet of the normal high-water line of any and all live streams in the leased area.
- d. Within 400 feet of any and all recreation developments within the leased area.
- e. Within 400 feet of any improvements either owned, permitted, leased, or otherwise authorized by the Bureau of Reclamation within the leased area.
- f. Within 200 feet of established crop fields, food plots, and tree/shrub plantings within the leased area.
- g. Within 200 feet of slopes steeper than a 2:1 gradient within the leased area.
- h. Within established rights-of-way of canals, laterals, and drainage ditches within the leased area.
- i. Within a minimum of 500 feet horizontal from the centerline of the facility or 50 feet from the outside toe of the canal, lateral, or drain embankment, whichever distance is greater, for irrigation facilities without clearly marked rights-of-way within the leased area.

- j. Providing that appropriate environmental measures can be ensured, and providing further that Reclamation project works and other public interests can be protected, Reclamation may consider, on a case-by-case basis, waiving the requirements specified in Section 2 hereof. HOWEVER, LESSEES ARE ADVISED THAT OBTAINING SUCH A WAIVER CAN BE A DIFFICULT, TIME CONSUMING, AND COSTLY PROCESS WITH NO GUARANTEE THAT RECLAMATION WILL GRANT THE REQUESTED WAIVER.

3. No occupancy of the surface or surface drilling will be allowed in the following areas. In addition, no directional drilling will be allowed that would intersect the subsurface zones delineated by a vertical plane in these areas. The following restrictions apply only to minerals tracts located within the boundary of a Bureau of Reclamation project where the United States owns 100% of the fee mineral interest.

- a. Within 1,000 feet of the maximum water surface, as defined in the Standard Operating Procedures (SOP), of any reservoirs and related facilities located within the leased area.
- b. Within 2,000 feet of dam embankments and appurtenance structures such as spillway structures, outlet works, etc.
- c. Within one-half (1/2) mile horizontal from the centerline of any tunnel within the leased area.
- d. Providing that appropriate environmental compliance measures can be ensured, and providing further that Reclamation project works and other public interests can be protected, Reclamation may consider, on a case-by-case basis, waiving the requirements specified in Section 3 hereof. HOWEVER, LESSEES ARE ADVISED THAT OBTAINING SUCH A WAIVER CAN BE A DIFFICULT, TIME CONSUMING, AND COSTLY PROCESS WITH NO GUARANTEE THAT RECLAMATION WILL GRANT THE REQUESTED WAIVER.

4. The distances stated in items 2 and 3 above are intended to be general indicators only. The Bureau of Reclamation reserves the right to revise these distances as needed to protect Bureau of Reclamation facilities.

5. The use of explosives in any manner shall be so controlled that the works and facilities of the United States, its successors and assigns, will in no way be endangered or damaged. In this connection, an explosives use plan shall be submitted to, and approved by, the Regional Director, Great Plains Region, Bureau of Reclamation, or his authorized representative.

6. The lessee shall be liable for all damage to the property of the United States, its successors and assigns, resulting from the exploration, development, or operation of the works contemplated by this lease, and shall further hold the United States, its successors and assigns, and its officers, agents, and employees, harmless from all claims of third parties for injury or damage sustained, or in any way resulting from, the exercise of the rights and privileges conferred by this lease.

7. The lessee shall be liable for all damage to crops or improvements of any entryman, non-mineral applicant, or patentee, their successors and assigns, caused by or resulting from, the drilling or other operations of the lessee, including reimbursement of any entryman or patentee, their successors and assigns, for all construction, operation, and maintenance charges becoming due on any portion of their said lands damaged as a result of the drilling or other operations of the lessee.

8. In addition to any other bond required under the provisions of this lease, the lessee shall provide such bond as the United States may at any time require for damages which may arise under the liability provisions of sections six (6) and seven (7) above.

Date

Signature of Lessee

GENERAL STIPULATIONS

1. All rights under this lease are subordinate to the right of the United States to flood and submerge the lands, permanently or intermittently, in connection with the construction and operation and maintenance of the _____ Dam and Reservoir, _____ Project, _____.
2. All surface work performed by the lessee on the lands shall be under the general supervision of the Area Manager, Bureau of Reclamation (Reclamation) in direct charge of the project, and shall be subject to such conditions and regulations as he may prescribe. Detailed plans and location for all structures, appurtenances thereto, and surface disturbance work on the leased lands shall be submitted to the said Area Manager for approval in advance of commencement of any surface work on the said leased lands. At least 60 days or more lead time is preferred. All oil or gas drilling and producing operations shall be under the supervision of the District Manager, Bureau of Land Management (BLM), in accordance with 43 CFR 3160. The authorized representatives of Reclamation and BLM shall have the right to enter on the leased premises at any time to inspect both the installation and operational activities of the lessee.

A. Predrilling Conditions:

1. No exploratory drilling, pit construction, or site clearing will occur until approval is granted by the appropriate Reclamation representatives in consultation with the local managing agency(s).
2. No well shall be drilled for oil or gas below the surface elevation of _____ feet. (This elevation restriction does not apply to areas downstream of the dam.) No drilling will be allowed within _____ feet of any developed recreation area.
3. All storage tanks shall be constructed outside the flood plain above elevation _____ feet (maximum water surface). This elevation restriction does not apply to areas downstream of the dam. Berms shall be constructed around storage batteries, tanks, and separators to contain their entire volume should an accidental spill or rupture occur.
4. Drilling a well for oil and gas is prohibited within _____ feet of any dam, dike, or other major structures, unless otherwise approved by the Area Manager in consultation with the local managing agency(s).
5. No well shall be drilled within 1/8 mile (660 feet) of a river, channel, permanent stream, tributary, or marsh site unless otherwise approved by the Area Manager in consultation with the local managing agency(s). To protect watersheds, slopes in excess of 40 percent (2.5:1) should be avoided where possible.
6. All drilling operations shall be conducted in accordance with the applicable State laws relative to municipal water supplies.

7. No surface disturbance shall occur until completion of an environmental analysis of the proposed drilling activity by Reclamation and all coordination matters are completed. This analysis will involve review of federally listed threatened and endangered plant and animal species, protection of wetlands, cultural resources, and water quality associated concerns. Certain data needs may be requested from the applicant proposing a surface disturbance action.

8. Where surface operations and facilities could reasonably be expected to discharge petroleum products into navigable waters and should oil or petroleum products be stored onsite and facilities have an aggregate storage of 1,320 gallons or more or single containers with capacity of 660 gallons or more, a "Spill Prevention Control and Counter Measure Plan" shall be prepared and must be maintained and kept available for inspection onsite (if manned) or at the nearest field office if unmanned. In the event of a spill or leakage, the lessee assumes all responsibility for cleanup and damages.

9. At lessee's expense, a cultural resource survey of lands that may be disturbed must be completed prior to any surface disturbance. If during operations the Lessee or any person working in his behalf discovers any historic or prehistoric ruin, monument or site, or any object of antiquity subject to the Archeological Resource Protection Act of 1979 or the National Historic Preservation Act of 1966, as amended, and Reclamation Instructions 376.11, then work shall be suspended and the discovery promptly reported to Reclamation. When directed by Reclamation's authorized representative, the Lessee shall obtain at his expense a qualified archeologist to examine and, if necessary, excavate or gather such ruins or objects.

10. No "mud pits" shall be constructed below elevation _____ feet. (This elevation restriction does not apply to areas downstream of the dam.) Pits shall be well constructed in such a manner to prevent leaching of chemicals into the water table and under no circumstances shall they be allowed to leak or be cut to drain. Lining mud pits with plastic may be required. They shall not be located on natural drainages. In some situations, such as drilling in a flood plain, a closed mud system may be required with containerization of drill cuttings. Waste or discharge of any kind shall not be allowed to enter any drainage. Any plastic material used to line pits and/or sumps shall be cut off below ground level, as far down as possible, and disposed of before the pits are covered. All unattended pits containing liquids shall be fenced, and the liquid portion shall be allowed to evaporate before the pits are broken.

11. The derrick shall not be located closer than one and one-half times its height from any electrical power transmission line unless prior approval is obtained from the owner of the power company. Signs shall be posted warning the public to prevent entry to the jobsite. Also, adequate blowout preventers shall be properly maintained.

12. All aboveground structures, not subject to applicable safety requirements, shall be painted to blend with the natural surroundings. The paint used shall be lusterless, nonreflective, flat, or semigloss color that blends with the area.

B. Roads

1. The Lessee shall observe the following restrictions during exploration:

a. Wherever possible, existing roads and trails are to be used as access to the drilling site. New road construction will be kept to a minimum, and new construction will not begin until the location is approved by the local managing agency.

b. Each existing fence to be crossed by the lessee shall be braced and tied off before cutting so as to prevent slacking of the wire. The opening shall be protected as necessary during construction and well operation to prevent the escape of livestock. Upon completion of construction, the fence shall be repaired to the original standard of the existing fence.

c. Cleared trees and shrubs will be removed and/or piled as brush piles for wildlife shelter as designated by the local managing agency. Available topsoil will be removed from the road right-of-way and stored in a topsoil stockpile.

d. New access roads shall normally be a maximum of 30 feet wide including drainage ditches and culverts. Road surface shall be graveled to a thickness identified as suitable for the safe operation of the vehicles and equipment at speeds proposed. The road shall be posted with curve signs and maximum speed limits. Speeds shall be limited on curves and posted to speeds that will permit a vehicle to be stopped within one-half the minimum sight distance. The road shall be maintained in safe condition.

e. At the request of the local managing agency, on new access roads the Lessee shall construct cattle guards or install gates with locks which will be maintained by the Lessee during drilling operations and all such times thereafter as production continues. Fencing of roads may be required.

f. Roads shall be maintained in suitable condition for vehicle passage during the duration of drilling activities with special consideration given to erosion control during wet and muddy periods.

g. Existing roads shall be returned to original or equivalent condition after drilling equipment has been removed.

h. All roads shall be adequately drained to control runoff and soil erosion. Drainage facilities may include ditches, water bars, culverts, and/or any other measures deemed necessary by Reclamation representatives. The following is a general guide for the spacing of water bars:

Present Slope

less than 2 percent	200 feet
2 to 4 percent	100 feet
4 to 5 percent	75 feet
more than 5 percent	50 feet

i. In the event of a "dry hole", any new road construction sites will be revegetated by the drilling company, with native and/or adapted grasses, forbs, and shrubs as requested by Reclamation, unless the local managing agency indicates in writing that the road is to remain. Revegetation is to be accomplished by seeding and fertilizing the area within 1 year of completion at recommended seeding rates and dates.

2. The Lessee shall observe the following stipulations should oil or gas be found and production activities occur:

a. Production company shall maintain road in suitable condition for vehicle passage. Public will be permitted to use road where existing road was originally open to such use. New road construction, if needed, can be exempt from public use.

b. Should the local managing agency deem it necessary to control vehicle traffic into the area during any season of the year, the production company will provide a metal gate and lock.

C. Drilling Pad and Reserve Pit:

1. Area cleared for the drilling pad site and reserve pit shall be the absolute minimum required for operations.

2. All trees and shrubs removed from the pad site shall be piled near the site at places designated by the local managing agency for use as wildlife shelters.

3. Available topsoil shall be removed from the drilling pad and pit site and stored in a topsoil stockpile.

4. Diesel fuel tanks and other potential pollution sources will be surrounded by an earthen berm of sufficient height to contain their entire volume in the event of an accidental leak or rupture.

5. The area will be kept well policed and free of trash and litter at all times, including access roads used solely by the Lessee. Litter blown out of the work area must be picked up. All waste associated with the drilling operations shall be removed and deposited in an approved sanitary landfill within 1 month after removal of the drilling rig. The Lessee shall comply with all State laws and regulations pertaining to the disposal of human waste.

6. For the protection of livestock and wildlife, all pits containing toxic liquids shall be fenced and covered with a fine mesh netting (i.e., hardware cloth) with openings being of one-half inch or less.

7. The Lessee will remove fluids and trash from all pits. The sludge pit will be pumped after drilling activities are completed and, following adequate drying, reshaped to original contours and covered with topsoil. This restoration must be accomplished within 90 days of completion of drilling. The area must then be revegetated as requested by Reclamation.

D. Actions with a Producing Well:

1. A minimum service area will be developed around the well head. No permanent material storage will be allowed on the lease. The remainder of the drilling pad will be covered with topsoil from the stockpile and restored to vegetation by tilling, fertilizing, and seeding. Specific seed types will be determined on a case-by-case basis by Reclamation in consultation with the local managing agency.
2. The Lessee may be required to utilize electric or submersible pumps, where feasible, rather than fuel-powered pumps (or other machinery). All electric lines must be buried to a depth of 15-18 inches.
3. All transfer lines from well site to tank battery, saltwater disposal well, or the like, must be buried 3 feet below the surface and a minimum depth of 4 feet at stream, creek, and river channel crossings.
4. When possible, a common point of collection shall be established to minimize the number of tank batteries.

E. Actions with a Nonproducing Well:

1. All disturbed areas will be recontoured, covered with topsoil, and revegetated. All trash will be removed from the lease site.
2. Gates and cattle guards shall be removed where requested by the local managing agency. Any openings in fences will be restored to original condition.

F. General:

1. The Lessee shall limit access to well and storage locations on the leased property to authorized personnel.
2. The Lessee agrees to cease all operations and make all necessary corrections to the satisfaction of the representative of Reclamation in consultation with the local managing agency before resuming any operations should any violations of the terms of this lease occur.
3. The Lessee shall not permit any nuisance to be maintained on the premises and shall not use said premises for any purposes other than those authorized in the lease. Before abandoning any well, the Lessee shall securely plug the same so as to effectually shut off water from the oil-bearing stratum.
4. The Lessee shall carry on the development and/or operation of the leased premises in a workmanlike manner and shall not commit or suffer to be committed waste upon the lands in his occupancy and use. In drilling operations, the Lessee shall only use so much of the land as is

necessary; shall safeguard the lakes and streams from any pollution; and shall not permit oil, saltwater, drilling mud, or other deleterious substances to escape onto the land, but the same shall be retained in proper tanks, receptacles, or in pits prepared for such purpose; and after the termination of drilling operations, any such pits shall be filled and land properly restored to its original condition, and only so much thereof shall be used in the production of the leased premises as is reasonably necessary to operate any well or wells thereon.

5. Lessee shall provide all subcontractors and assigns, especially the dirt contractor, with a copy of the above stipulations prior to construction of the road, pad, or associated developments.

Area Manager
Oklahoma-Texas Area Office
Bureau of Reclamation
420 West Main, Suite 630
Oklahoma City, Oklahoma 73102

U.S. ARMY COE SPECIAL STIPULATIONS 1-A

1. All oil and gas drilling and production operations shall be under the supervision of the District Manager, Bureau of Land Management (BLM), in accordance with 43 Code of Federal Regulations 3160.
2. The Secretary of the Army or designee reserves the right to require cessation of operations if a national emergency arises or if the Army needs the leased property for a mission incompatible with lease operations. On approval from higher authority, the District Engineer will give notice of the required suspension. The lessee agrees to this condition and waives compensation for its exercise.
3. If the District Engineer or his authorized representative discovers an imminent danger to safety or security which allows no time to consult BLM, that person may order such activities stopped immediately. The District Manager, BLM, will be notified immediately, will review the order, and will determine the need for further remedial action.
4. Lessee liability for damage to improvements shall include improvements of the Department of Defense. Lessee shall be liable for pollution and other damages, as a result of their operations, to Government-owned land and property and to the property of the Government's authorized surface user.
5. Before beginning to drill, the lessee must consult with third parties authorized to use real estate in the lease area and must consider programs for which third parties have contractual responsibility.
6. A license to conduct geophysical test on the leased area must be obtained separately from the District Engineer.
7. That all rights under this lease are subordinate to the rights of the United States to flood and submerge the lands, permanently or intermittently, in connection with the operation and maintenance of the above-named project.
8. That the United States shall not be responsible for damages to property or injuries to persons which may arise from or be incident to the use and occupation of the said premises, or for damages to the property of the lessee, or for injuries to the person of the lessee's officers, agents, servants, or employees, or others who may be on said premises at their invitation or the invitation of any one of them arising from or incident to the flooding of the said premises by the Government or flooding from any other cause, or arising from or incident to any other governmental activities; and the lessee shall hold the United States harmless from any and all such claims.
9. That the work performed by the lessee on the lands shall be under the general supervision of the District Engineer, Corps of Engineers in direct charge of the project and subject to such conditions and regulations as may be prescribed by him, and the plans and locations for all structures, appurtenances thereto, and work on said lands shall be submitted to the said District Engineer for approval in advance of commencement of any work on said lands. The District Engineer shall have the right to enter on the premises, at any time, to inspect both the installation and operational activities of the lessee.
10. That no structure or appurtenance thereto shall be of a material or construction determined to create floatable debris.
11. That the construction and operation of said structures and appurtenances thereto shall be of such a nature as not to cause pollution of the soils and the waters of the project.
12. That the United States reserves the right to use the land jointly with the lessee in connection with the construction, operation, and maintenance of the Government project and to place improvements thereon or to remove materials therefrom, including sand and gravel and other construction material, as may be necessary in connection with such work, and the lessee shall not interfere in any manner with such work, and the lessee shall not interfere in any manner with such work or do any act which may increase the cost of performing such work. If the cost of the work performed on land outside the property included in the lease is made more expensive by reason of improvements constructed on the leased property by the lessee, the lessee shall pay to the United States money in the amount, as estimated by the Chief of Engineers, sufficient to compensate for the additional expense involved.

13. All areas within 2,000 feet of any major structure, including but not limited to the dam, spillway, or embankment, are restricted areas. The lessee, his operators, agents, or employees shall not utilize the surface of restricted areas for any purpose. Drilling operations in, on, or under the restricted areas, including drilling outside of the restricted areas which would cause a bore hole to be under the restricted area, will not be permitted. The restricted areas are included in the lease for the sole purpose of becoming part of a drilling unit so that the United States will share in the royalty of the unit.

14. All existing or proposed public use areas, recreation areas, wildlife and waterfowl refuges, historical sites, and hiking and horseback trail areas may be leased for the sole purpose of becoming a part of a drilling unit. The lessee, his operators, agents, or employees will not use or enter upon the surface for any purpose. Directional drilling from non-public areas is permitted if not otherwise restricted.

15. No drilling will be permitted from Government-owned surface where alternate surface use is available within the same drilling unit.

16. All storage tanks and slush pits will be protected by dikes of sufficient capacity to protect the reservoir from pollution to flood pool elevation ____ feet, National Geodetic Vertical Datum.

17. It is the responsibility of the lessee to identify and be aware of areas where entry is prohibited. There will be no surface or subsurface entry within 2,000 feet of the dam structure. A portion of the lease includes the ____ Public Use Area, therefore, stipulation ____ is applicable. Stipulation ____ also applies to portions of the lease area.

18. The operator will immediately stop work and advise the District Engineer or his authorized representative if contamination is found in the operating area.

LONE STAR ARMY AMMUNITION PLANT

MINERAL LEASING STIPULATIONS

Subject Lease No. _____

It is understood by all parties that the following fifteen (15) mineral leasing stipulations are a part of subject lease and may be waived or modified only upon the written concurrence of the installation commander, Lone Star Army Ammunition Plant, Texas (LSAAP), (hereinafter "Commander") and the written approval of the Department of the Interior's Bureau of Land Management (hereinafter "BLM"), or authorized representatives. Compliance with these stipulations will be at no cost to the United States:

1. The Lessee understands that its activity on LSAAP requires prior approval of the BLM, and that BLM approval requires the concurrence of the Commander, where necessary. Requirements which may be imposed include but are not limited to prohibitions or specifications on:
 - a. access (e.g., time of year, gates, roads, construction, maintenance, pipelines, vegetation disposal);
 - b. exploration activities;
 - c. location, design, and timing of construction of drilling, collection, and storage facilities (e.g., burial of wellhead and equipment in underground bunkers, depth of burial of flow lines);
 - d. use and protection of LSAAP water supply (e.g., water quality testing);
 - e. protection of the environment (e.g., hazardous waste areas, endangered species, erosion control, pollution prevention) and protection of objects of historic and scientific significance;
 - f. safety and fire protection measures (e.g., use of explosives, safe working distances from ammunition and explosives, construction and maintenance of firebreaks, development of contingency plans in the event of danger to persons or property, posting of signs);

- g. use of communication and transportation systems;
- h. LSAAP security (e.g., authorized operation hours, worker identification);
- i. management of production area (e.g., size, fencing, gates, cattle guards, interim revegetation);
- j. reclamation measures; or
- k. attendance at meetings (e.g., pre-operations conference, post-operations conference).

2. The Lessee may only occupy the surface of the lands that are cross-hatched identified on the attached map, Exhibit "A"; the remaining areas identified on Exhibit "A" are only available for directional drilling.

3. The Lessee will make every effort to locate pipeline and access routes in existing utility and road corridors. The Lessee will furnish as-built drawings of completed pipelines at a scale and detail specified by the Commander.

4. The Lessee in accepting this lease understands that the leased lands are part of LSAAP, a military installation. Mineral exploration and development in any restricted impact areas or areas involving ammunition or explosives is prohibited; however, these lands may be explored and produced by directional drilling at a safe distance from outside the areas as prescribed by Department of Defense ("DOD") or Department of the Army ("Army") regulations. Furthermore, the Lessee understands that future increased production, testing or storage of ammunition or explosives may further restrict the surface area available for lease operations. Safe distances from ammunition and explosive facilities are based on the quantity and type of explosive present or authorized and the proposed use (e.g., above or below ground, continuous or temporary presence of personnel). The Lessee may obtain pertinent information on this subject from the LSAAP safety office.

5. Before beginning any approved operations on LSAAP the Lessee must consult with third parties authorized to use real estate in the leased area and must document in any proposals for development the manner in which consideration is being given to programs for which third parties have contractual rights or responsibility. The Lessee may consult the records of the District Engineer, Fort Worth, Texas (hereinafter

"District Engineer") to determine what real estate interests have been granted to third parties on LSAAP. On request of the BLM, the Commander may seek to resolve disputes between the Lessee and third parties if they cannot reach agreement. Resolutions will be coordinated with contracting officers or representatives of all parties involved. The Lessee shall hold the United States harmless for claims by such third parties arising from the Lessee's activities, including damage to pasture and cropland capabilities.

6. Merchantable timber cleared from roads, pipeline rights of way, or drill sites will be disposed of in accordance with the Commander's instructions.

7. The Lessee shall bear all costs of the following:

a. Increased Army costs for its projects which are incurred by reason of the Lessee's activity on LSAAP. Such costs will be paid when demanded on a one time basis as a condition of approval of proposed operations.

b. Any Army costs to administer and ensure lease compliance not otherwise funded by the Congress.

c. The Lessee's share of road and bridge maintenance costs for use of LSAAP roads and bridges in accordance with a maintenance agreement. In calculating such costs, the drilling and production area, pipeline right-of-way, lengths of roads and bridges, and so forth will be considered. Payments shall be made in advance as a result of negotiations between LSAAP and the Lessee.

d. Repair or restoration for damage or degradation of land or facilities, including that caused by subsidence and pollutant spills, resulting from the Lessee's activities. Where conditions of urgency exist as determined by the Commander and time is of the essence, the Lessee shall repair damages or degradation in a timely fashion in the manner specified by the Commander without awaiting confirmation from BLM. The Commander shall subsequently confirm oral orders to the Lessee in writing with copy furnished BLM and the District Engineer. If the Lessee cannot or will not immediately comply, the Commander may immediately act, and the Lessee shall be liable for reimbursement to the Army for all damages and costs of such action, including administrative costs and any surcharges that may be deemed appropriate.

8. The Lessee shall not pollute the air, ground, or water (including ground water) or create a public nuisance:

a. Before beginning operations, the Lessee shall retain a local agent who may be served notice on these matters and who shall notify the Commander immediately of spills, or other unexpected threats or hazards to the environment.

b. The Lessee shall hold the United States harmless for any claim, including equitable claims, court or legal expenses incurred by the United States, and fines or penalties imposed upon the United States which are related to unlawful pollution arising from the Lessee's use of the property.

9. The United States reserves the option to purchase up to one-hundred percent (100%) of the natural gas or oil refined, at the price defined below, under a utility service contract to be negotiated prior to the exercise of this right in accordance with present or future DOD or Army regulations. Any product purchased by the Government shall be for the sole use of Army or DOD installation tenants located within a one-hundred fifty (150) mile radius of Headquarters, LSAAP and not for resale to the public. The Lessee shall include this paragraph in any contract or sale of natural gas or oil to other parties.

a. The Lessee shall, in its sole discretion, determine whether oil or gas reserves are present on LSAAP in sufficient quantities to permit commercial development. After the Lessee has determined and declared that commercial production is possible, the Government and Lessee will have four (4) months in which to negotiate the specific terms of any sale and begin delivery of production. Except during mobilization or surge periods, the Commander shall have the right to change its election under this option, but in no case more often than once every twelve (12) months.

b. The price paid to the Lessee by the United States shall be the average of the three lowest publicly-posted or "spot" prices for the delivered, refined product as announced monthly by the three largest purchasers in Texas Railroad Commission District-6. Specific details of the price and actual quantity of product shall be negotiated during sales contract procedures. The sale price may be adjusted to reflect

any unusual (unanticipated) capital investment and transportation costs incurred by the Lessee. Such costs should be negotiated in paragraph 9a. In all cases, the Lessee shall bear all costs on a nonreimbursable basis associated with maintaining the well site (including meters) during the producing life of the well and salvaging such facilities when production is ended.

c. The Lessee shall routinely inspect and calibrate equipment involved with the exercise of this option with (BLM). BLM may require the Lessee at least annually to engage an independent party acceptable to BLM to test meters for accuracy and to furnish written findings to BLM.

10. Notwithstanding any other stipulation, or condition of the lease, the United States and its officers, agents, servants and employees ("the released parties") shall not be responsible for damages to property, injury to persons, or any other cause of action ("released actions") which may arise from or be incident to this lease or the Lessee's use and occupation of the leased premises. Released actions include, without limitations, damages to the Lessee's property, injury to the Lessee's person, or other cause of action of the Lessee, or such damage, injury or other cause of action of the Lessee's officers, agents, servant employees, invitees of any of these, or anyone else otherwise on or off said premises incident to the lease. Released actions include any actions arising from flooding of the lease premises. The Lessee shall hold harmless and indemnify the released parties for released actions which may arise from or be incident to this lease or the Lessee's use or occupation of the leased premises.

11. The Lessor's rights described in the printed BLM lease form include the rights of the Army.

12. The Secretary of the Army or designee reserves the right to require cessation of operation if a national emergency arises or if the Army needs the leased premises for a mission incompatible with lease operations. On approval from higher authority, the Commander will give the Lessee written notice or, if time permits, request the BLM to give notice of the required cessation. The Lessee understands the lease rights granted by this instrument do not include the period of any such cessation and the United States has no obligation to compensate the Lessee for damages (including contractual losses) resulting from the

exercise of this stipulation. The Lessee shall include this stipulation in contracts with third parties to supply oil and gas. This stipulation shall not affect the Lessee's right to seek suspension of the lease term from the BLM. Whether or not a suspension is granted will have no effect on cessation of operations as stipulated herein.

13. If the Commander or the authorized representative discovers an imminent danger to safety or security which allows no time to consult BLM, that person may order such activities stopped immediately. The authorized officer of BLM shall review the order and determine the need for further remedial action.

14. If military or explosive contamination is found in the operating area, the operator shall immediately stop work, leave the area, notify the Commander and not return until the Commander advises that it is safe to return.

15. It is in the best interest of LSAAP to determine if commercial deposits of oil or gas exist within LSAAP boundaries. The Authorized Officer (AO) of the BLM may specify rates of development and production pursuant to Section 4 of the Lease Terms and the Oil and Gas Operations Regulations at 43 CFR 3162.2(c). Accordingly, the operator will commence drilling within thirty-six (36) months of the effective date of this lease on acreage available for occupancy on this lease, or within an approved exploratory unit which includes this lease. Drilling operations shall be diligently prosecuted until a well capable of adequately testing, at a minimum, Paluxy, Moorings Port, and the Smackover Formations has been drilled. The operator shall not in any event be required to drill said well to a depth in excess of 8,500 feet. With the approval of the AO, a completion to a lesser depth than the Smackover may be made. However, not later than twelve (12) months after said completion to a lesser depth, the operator shall commence drilling a well to test, at a minimum, the Formations mentioned above. Additional wells may be drilled as deemed necessary by the AO, after consultation with the Lessee, based on test results and well spacing rules.

Failure to comply with this stipulation will result in an assessment, civil penalty, or lease cancellation pursuant to 43 CFR 3162. The Lessee has the option to voluntarily cancel the lease in lieu of the assessment or civil penalty.

Date

Lessee's Signature

LONE STAR ARMY AMMUNITION PLANT
INSTALLATION CONDITIONS FOR SITE APPROVAL

Subject Lease No. _____

It is understood by all parties that the following sixteen (16) installation conditions for site approval (the "Conditions") are a part of subject lease and may be waived or modified only upon the written concurrence of the installation commander, Lone Star Army Ammunition Plant, Texas (LSAAP), (hereinafter "Commander") and the written approval of the Department of the Interior's Bureau of Land Management (hereinafter "BLM"), or authorized representatives. The Lessee's compliance with these Conditions will be at no cost to the United States:

1. The routing of all supply pipelines, as well as material workmanship specifications shall be approved in advance by LSAAP. Pipeline access routes have yet to be determined by LSAAP.
2. The Lessee's access to LSAAP shall be through existing gates and roads as approved in advance by the Commander. No temporary gates shall be installed in LSAAP's perimeter fence.
3. New road routes, if any, will be approved by LSAAP before the start of construction. Such roads shall be properly drained, terraced to prevent erosion, compacted and surfaced to provide for all weather access to wells and equipment. The Lessee will maintain these roads for the duration of the underlying lease. Roads to drilling sites of wells with no production capability shall be restored to original condition immediately after the site is abandoned unless LSAAP Commander accepts the road and the maintenance responsibility for it.
4. Proposed activities have been reviewed and approved by the appropriate safety offices to include site approval by the Department of Defense Explosive Safety Board. Any and all changes to activities must have prior approval by the appropriate Safety Office.
5. Producing wells shall be enclosed with a permanent fence which shall enclose an area not to exceed the minimum required for operation and maintenance of the well as mutually determined by LSAAP and the Lessee.

The fencing shall be 72" chain link utilizing steel posts. Fence gates shall be kept locked and the Lessee shall furnish LSAAP Commander with keys to all locks.

6. Lessee is required to comply with security regulations as stipulated in DARCOM-R 190-3 as well as any and all LSAAP security regulations and the LSAAP Protection Plan.

7. Lessee is required to comply with fire and safety regulations in accordance with AMC-R 385-100, Safety Manual, as well as any and all plant safety and fire regulations. Firebreaks (50' minimum clear zone) are required around drilling sites, fences, pipelines, and as required by the Commander.

8. The LSAAP underground water table must not be contaminated nor disturbed or disrupted. The Lessee shall not contaminate any surface water, soil, air, or groundwater.

9. Hazardous and non-hazardous waste material will be disposed of in accordance with LSAAP, State of Texas, and Federal regulations; disposal of hazardous materials will be off LSAAP.

10. Charges for any administrative assistance, monitoring, or relocation of explosives will be assessed by LSAAP at a man-hour plant rate determined by the activity involved (guards, production, engineering, etc.). These charges will be reviewed annually and will be changed when necessary to reflect the Government's cost for providing these services. A separate negotiated agreement will be required for these services. Advance payment, at the discretion of the Commander, may be required as part of the contract.

11. Drilling on or under any lease, license, permit or easement stated in the report of Availability is permitted so long as the use granted thereunder is not disturbed. Known easements on LSAAP consist of, but are not limited to:

a. Access to families of individuals buried on the 5.5 acres of cemeteries maintained by LSAAP.

b. Approximately 13 SF in the telephone communications building (1-4) for General Telephone (GTE) to supply switch gear.

c. Lake Texarkana Water Supply Corporation for a 30" line along the northern border.

d. Southwestern Electric Power Company for a transmission line along the southwestern border.

12. The Lessee shall provide completely installed, maintained, and operable supply systems from the wellhead to existing LSAAP distribution lines if and when the Government exercises its option to purchase up to One-Hundred Percent (100%) of the well's natural gas or oil production. The supply systems shall meet the following requirements, or current industry standards:

a. Materials - All piping shall be schedule 40 steel. Welded joints are required for underground piping and for piping 2-1/2" diameter or more if above ground. Above ground piping of 2" diameter or less may be screw joints. All piping, valves and fittings shall meet existing E.P.A. requirements for high pressure gas distribution systems, as well as American National Standards Institute Specification B31.8 (latest edition) for Gas Transmission and Distribution Piping Systems.

b. Coating - All underground piping shall be coated with coal tar enamel and glass fiber reinforced felt or suitable factory applied polyethylene or plastic coating (tape rapped at joints) to fully meet all E.P.A. recommendations/requirements for gas distribution lines. Cathodic protection shall be provided by magnesium anodes or rectifier/ground-bed systems. The Government shall review and approve proposed systems and shall perform quality control testing and inspection of piping, coating and cathodic protection systems.

c. Welding and General Workmanship - Welding and general workmanship shall be in accordance with all E.P.A. and A.N.S.I. requirements for high pressure gas distribution systems.

d. Size of Piping - Size of piping shall be sufficient to convey 50 percent of the well's production capacity, to the specified delivery point with a minimum delivery pressure of 50 PSIG and a maximum line pressure of 15 PSIG. Sizing shall be approved in advance by the Government.

e. Meters - Meters shall be provided, installed, maintained, and calibrated by the Lessee, and shall be of type and quality equivalent to those used by the alternative non-Government gas purchaser. Meters shall be installed at the point of entry into the Government

gas distribution system.

f. Pressure Regulators and Accessories - Pressure regulators and accessories shall be provided and maintained by the Lessee to automatically pass gas into LSAAP distribution system as required to maintain a system pressure of 50 PSIG at the delivery point.

13. The Lessee is required to provide all necessary data to LSAAP to permit development of a Safety Site Plan which must be approved at all necessary Army command levels prior to the Army concurring with either a Notice of Staking or an Application for Permit to Drill.

14. Herbicides may be used by the Lessee to maintain clear zones. Any herbicides proposed for use must be coordinated with LSAAP pest management coordinated through AMCCOM prior to use. Only those herbicides approved by the Environmental Protection Agency are acceptable. The Lessee will report to LSAAP pest management coordinator monthly herbicide usage not later than the third working day after the end of the month of use. Negative reports are not required.

15. The Lessee shall not establish any drill site, pipeline, or any other facilities within 200 feet of any cemetery or other potential historical site (see Exhibit F) within LSAAP. Explosive or seismic methods will not be employed within 500 feet of any cemetery or other historic site unless otherwise approved by the Commander. The Lessee will be responsible for any damages to headstones, markers, fences, or other property in area of the historic site, or access roads to same, that result from its operations. Exploration or exploitation actions proposed in the vicinity of historic sites will require coordination with, and approval by, the State Historic Preservation Office.

16. Leasing is permitted for oil and natural gas only.

Date

Lessee's Signature

SPECIAL STIPULATIONS ATTACHED TO AND MADE A PART OF

LEASE NM-A

TEXAS

1. The lessee understands and agrees that a negative easement is imposed in and upon said land to prohibit the drilling or deepening of any well for the purpose of producing oil and/or gas and other minerals provided, however, that exploration and development of oil and/or gas and other minerals under said land will be permitted by directional drilling from locations off the said land and above the 307-foot elevation traverse.
2. No drilling operations are permitted which will cause contamination of the Falcon Reservoir, or the Rio Grande. Before drilling operations commence, works, including but not limited to, a reserve pit, satisfactory to and as required by the United States Commissioner, International Boundary and Water Commission, United States and Mexico, shall be constructed of sufficient size and maintained so as to hold all contaminants, well cuttings, trash debris, refuse, etc., and to prevent them from getting into Falcon Reservoir or into the Rio Grande; and further, the lessee shall be liable for all damages due to any contamination of the Falcon Reservoir, or the Rio Grande, resulting from his operations.
3. The lessee agrees that all drilling, exploration, development and producing operations will be in conformance with the requirements of the Texas Railroad Commission and agencies of the State of Texas responsible for environmental concerns.
4. The lessee agrees not to subdivide or assign this lease without the prior written approval of the said United States Commissioner, 4110 Rio Bravo, El Paso, Texas 79902, first had and obtained prior to submission for approval to the Department of the Interior.

Lessee

SPECIAL STIPULATIONS ATTACHED TO AND MADE A PART OF

LEASE NM-A

TEXAS

1. The lessee understands and agrees that a negative easement is imposed in and upon said land to prohibit the drilling or deepening of any well for the purpose of producing oil and/or gas and other minerals provided, however, that exploration and development of oil and/or gas and other minerals under said land will be permitted by directional drilling from locations off the said land and above the 1144.3-foot elevation contour.
2. No drilling operations are permitted which will cause contamination of the Amistad Reservoir, or the Rio Grande, Pecos or Devils Rivers. Before drilling operations commence, works, including but not limited to, a reserve pit, satisfactory to and as required by the United States Commissioner, International Boundary and Water Commission, United States and Mexico, shall be constructed of sufficient size and maintained so as to hold all contaminants, well cuttings, trash, debris, refuse, etc., and to prevent them from getting into Amistad Reservoir or into the Rio Grande, Devils or Pecos Rivers; and further, the lessee shall be liable for all damages due to any contamination of the Amistad Reservoir, or the Rio Grande, Pecos or Devils Rivers resulting from his operations.
3. Upon completion of the well, all pits--after settling or drying--shall be filled and the location area shall be graded so as to resemble, as nearly as practicable, the land conditions prior to drilling.
4. The lessee agrees not to subdivide or assign this lease without the prior written approval of the said United States Commissioner, first had and obtained prior to submission for approval to the Department of the Interior.

Lessee

LEASE STIPULATIONS
OIL & GAS LEASING
RANDOLPH AIR FORCE BASE, TEXAS

No surface occupancy permitted. Pooling of minerals or extraction of minerals via slant drilling or other methods is permitted provided that such activity does not detrimentally impact the flying training mission at Randolph Air Force Base, Texas. The 12th Civil Engineer Squadron, Randolph AFB, TX 78150-4513 must approve all drilling locations prior to the BLM approving any applications for permits to drill.

LEASE STIPULATIONS
OIL & GAS LEASING
SEGUIN AIR FORCE AUXILIARY AIRFIELD, TEXAS

No surface occupancy permitted. Pooling of minerals or extraction of minerals via slant drilling or other methods is permitted provided that such activity does not detrimentally impact the flying training mission at Seguin Air Force Auxiliary Field. The 12th Civil Engineer Squadron, Randolph AFB, TX 78150-4513 must approve all drilling locations prior to the BLM approving any applications for permits to drill.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Serial No. _____

OFFER TO LEASE AND LEASE FOR OIL AND GAS

The undersigned (reverse) offers to lease all or any of the lands in Item 2 that are available for lease pursuant to the Mineral Leasing Act of 1920, as amended and supplemented (30 U.S.C. 181 et seq.), the Mineral Leasing Act for Acquired Lands of 1947, as amended (30 U.S.C. 351-359), the Attorney General's Opinion of April 2, 1941 (40 Op. Atty. Gen. 41), or the

READ INSTRUCTIONS BEFORE COMPLETING

1. Name _____
Street _____
City, State, Zip Code _____

2. This application/offer/lease is for: (Check only One) ☐ PUBLIC DOMAIN LANDS ☐ ACQUIRED LANDS (percent U.S. interest _____)

Surface managing agency if other than BLM: _____ Unit/Project _____

Legal description of land requested: _____ *Parcel No.: _____ *Sale Date (m/d/y): ____ / ____ / ____

***SEE ITEM 2 IN INSTRUCTIONS BELOW PRIOR TO COMPLETING PARCEL NUMBER AND SALE DATE.**

T. _____ R. _____ Meridian _____ State _____ County _____

Amount remitted: Filing fee \$ _____ Rental fee \$ _____ Total acres applied for _____
Total \$ _____

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T. _____ R. _____ Meridian _____ State _____ County _____

Total acres in lease _____

Rental retained \$ _____

This lease is issued granting the exclusive right to drill for, mine, extract, remove and dispose of all the oil and gas (except helium) in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon for the term indicated below, subject to renewal or extension in accordance with the appropriate leasing authority. Rights granted are subject to applicable laws, the terms, conditions, and attached stipulations of this lease, the Secretary of the Interior's regulations and formal orders in effect as of lease issuance, and to regulations and formal orders hereafter promulgated when not inconsistent with lease rights granted or specific provisions of this lease.

NOTE: This lease is issued to the high bidder pursuant to his/her duly executed bid or nomination form submitted under 43 CFR 3120 and is subject to the provisions of that bid or nomination and those specified on this form.

Type and primary term of lease:

THE UNITED STATES OF AMERICA

☐ Noncompetitive lease (ten years)

by _____
(Signing Officer)

☐ Competitive lease (five years)

(Title) (Date)

☐ C _____

EFFECTIVE DATE OF LEASE _____

4. (a) Underlies that certifies that (1) offeror is a citizen of the United States, an association of such citizens; a municipality; or a corporation organized under the laws of the United States or of any State or Territory thereof; (2) all parties holding an interest in the offer are in compliance with 43 CFR 3100 and the leasing authority; (3) offeror's chargeable interests, direct and indirect in either public domain or acquired lands do not exceed 246,080 acres in Federal oil and gas leases in the same State in which not more than 200,000 acres are held under option, or 300,000 acres in leases and 200,000 acres in options in either leasing District in Alaska; (4) offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located; (5) offeror is in compliance with qualifications concerning Federal coal lease holdings provided in sec. 2(a)(2)(A) of the Mineral Leasing Act; (6) offeror is in compliance with reclamation requirements for all Federal oil and gas lease holdings as required by sec. 17(g) of the Mineral Leasing Act; and (7) offeror is not in violation of sec. 41 of the Act.
- (b) Underlies agrees that signature to this offer constitutes acceptance of this lease, including all terms, conditions, and stipulations of which reference has been given notice, and any amendment or separate lease that may include any land described in this offer open to leasing at the time this offer was filed but omitted for any reason from this lease. The offeror further agrees that this offer cannot be withdrawn, either in whole or in part, unless the withdrawal is received by the proper BLM State Office before this lease, an amendment to this lease, or a separate lease, whichever covers the land described in the withdrawal, has been signed on behalf of the United States.

This offer will be rejected and will afford offeror no priority if it is not properly completed and executed in accordance with the regulations, or if it is not accompanied by the required payments. 18 U.S.C. Sec. 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

Duly executed this _____ day of _____, 19____ (Signature of Lessee or Attorney-in-fact)

LEASE TERMS

Sec. 1. Rentals—Rentals shall be paid to proper office of lessor in advance of each lease year. Annual rental rates per acre or fraction thereof are:

- (a) Noncompetitive lease, \$1.50 for the first 5 years; thereafter \$2.00;
- (b) Competitive lease, \$1.50; for primary term; thereafter \$2.00;
- (c) Other, see attachment, or as specified in regulations at the time this lease is issued.

If this lease or a portion thereof is committed to an approved cooperative or unit plan which includes a viable capable of producing leased resources, and the plan contains a provision for allocation of production, royalties shall be paid on the production allocated to this lease. However, annual rentals shall continue to be due at the rate specified in (a), (b), or (c) for those lands not within a participating area.

Failure to pay annual rental, if due, on or before the anniversary date of this lease (or next official working day if office is closed) shall automatically terminate this lease by operation of law. Rentals may be waived, reduced, or suspended by the Secretary upon a sufficient showing by lessee.

Sec. 2. Royalties—Royalties shall be paid to proper office of lessor. Royalties shall be computed in accordance with regulations on production removed or sold. Royalty rates are:

- (a) Noncompetitive lease, 12½%;
- (b) Competitive lease, 12½%;
- (c) Other, see attachment, or as specified in regulations at the time this lease is issued.

Lessor reserves the right to specify whether royalty is to be paid in kind, and the right to establish reasonable minimum values on products after giving lessee notice and an opportunity to be heard. When paid in value, royalties shall be due and payable on the last day of the month following the month in which production occurred. When paid in kind, production shall be delivered, unless otherwise provided by the lessor, in merchantable condition on the premises where produced without cost to lessor. Lessor shall not be required to hold such production in storage beyond the last day of the month following the month in which production occurred, nor shall lessee be held liable for loss or destruction of royalty oil or other products in storage from causes beyond the reasonable control of lessee.

Minimum royalty in lieu of rental of not less than the rental which otherwise would be required for that lease year shall be payable at the end of each lease year beginning on or after a discovery in paying quantities. This minimum royalty may be waived, suspended, or reduced, and the above royalty rates may be reduced, for all or portions of this lease if the Secretary determines that such action is necessary to encourage the greatest ultimate recovery of the leased resources, or is otherwise justified.

An interest charge shall be assessed on late royalty payments or underpayments in accordance with the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA) (50 U.S.C. 1701). Lessee shall be liable for royalty payments on oil and gas lost or wasted from a lease site which such loss or waste is due to negligence on the part of the operator, or due to the failure to comply with any rule, regulation, order, or citation issued under FOGRMA or the leasing authority.

Sec. 3. Bonds—A bond shall be filed and maintained for lease operations as required under regulations.

Sec. 4. Diligence, rate of development, utilization, and drainage—Lessor shall exercise reasonable diligence in developing and producing, and shall prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves right to specify rates of development and production in the public interest and to require lessee to subscribe to a cooperative or unit plan, within 30 days of notice, if deemed necessary for proper development and operation of area, field, or pool embracing these leased lands. Lessor shall drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in amounts determined by lessor.

Sec. 5. Documents, evidence, and inspection—Lessor shall file with proper office of lessor, not later than 30 days after effective date thereof, any contract or evidence of other arrangement for sale or disposal of production. At such times and in such form as lessor may prescribe, lessee shall furnish detailed statements showing amounts and quality of all products removed and sold, shall provide for production purposes or unavailability lost. Lessee may be required to provide plans and schematic diagrams showing development work and improvements, and reports with respect to parties in interest, expenditures, and depreciation costs. In the form prescribed by lessor, lessee shall keep a daily drilling record, a log, information on well surveys and tests, and a record of subsurface investigations and furnish copies to lessor when required. Lessee shall keep open at all reasonable times for inspection by any authorized officer of lessor, the leased premises and all wells, improvements, machinery, and fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or in the leased lands. Lessor shall maintain copies of all contracts, sales agreements, accounting records, and documentation such as billings, invoices, or similar documentation that supports

costs claimed as manufacturing, preparation, and/or transportation costs. All such records shall be maintained in lessee's accounting offices for future audit by lessor. Lessee shall maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

During existence of this lease, information obtained under this section shall be closed to inspection by the public in accordance with the Freedom of Information Act (5 U.S.C. 552).

Sec. 6. Conduct of operations—Lessor shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee shall take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.

Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may be required to complete minor inventory or short term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in the destruction of such species or objects.

Sec. 7. Mining operations—To the extent that impacts from mining operations would be substantially different or greater than those associated with normal drilling operations, lessor reserves the right to deny approval of mining operations.

Sec. 8. Extraction of helium—Lessor reserves the option of extracting or having extracted helium from gas production in a manner specified and by means provided by lessor at no expense or loss to lessor or owner of the gas. Lessee shall include in any contract of sale of gas the provisions of this section.

Sec. 9. Damages to property—Lessor shall pay lessor for damage to lessor's improvements, and shall save and hold lessor harmless from all claims for damage to or harm to person or property as a result of lease operations.

Sec. 10. Protection of diverse interests and equal opportunity—Lessor shall: pay when due all taxes legally assessed and levied under laws of the State or the United States; accord all employees complete freedom of purchase; pay all wages at least twice each month in lawful money of the United States; maintain a safe working environment in accordance with standard industry practices; and take measures necessary to protect the health and safety of the public.

Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. If lessee operates a pipeline, or owns or controls an interest in a pipeline or a company operating a pipeline, which may be operated exclusively to oil derived from these leased lands, lessee shall comply with section 28 of the Mineral Leasing Act of 1920.

Lessor shall comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessor nor lessee's subcontractors shall maintain segregated facilities.

Sec. 11. Transfer of lease interests and relinquishment of lease—As required by regulations, lessee shall file with lessor any assignment or other transfer of an interest in this lease. Lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which shall be effective as of the date of filing, subject to the continued obligation of the lessee and surety to pay all accrued rentals and royalties.

Sec. 12. Delivery of premises—At such times as all or portions of this lease are returned to lessor, lessee shall place affected wells in condition for suspension or abandonment, reclaim the land as specified by lessor and, within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells.

Sec. 13. Proceedings in case of default—If lessee fails to comply with any provisions of this lease, and the noncompliance continues for 30 days after written notice thereof, this lease shall be subject to cancellation unless or until the lesseehold contains a viable capable of production of oil or gas in paying quantities, or the lease is committed to an approved cooperative or unit plan or communitization agreement which contains a viable capable of production of oil or gas in paying quantities. This provision shall not be construed to prevent the exercise by lessor of any other legal and equitable remedy, including waiver of the default. Any such remedy or waiver shall not prevent later cancellation for the same default occurring at any other time. Lessee shall be subject to applicable provisions and penalties of FOGRMA (50 U.S.C. 1701).

Sec. 14. Heirs and successors-in-interest—Each obligation of this lease shall extend to and be binding upon, and every benefit hereof shall inure to the heirs, executors, administrators, successors, beneficiaries, or assignees of the respective party.

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

LEASE STIPULATIONS
BUREAU OF RECLAMATION

The lessee agrees to maintain, if required by the lessor during the period of this lease, including any extension thereof, an additional bond with qualified sureties in such sum as the lessor, if it considers that the bond required under Section 2(a) is insufficient, may at any time require:

(a) to pay for damages sustained by any reclamation homestead entryman to his crops or improvements caused by drilling or other operations of the lessee, such damages to include the reimbursement of the entryman by the lessee, when he uses or occupies the land of any homestead entryman, for all construction and operation and maintenance charges becoming due during such use or occupation upon any portion of the land so used and occupied;

(b) to pay any damage caused to any reclamation project or water supply thereof by the lessee's failure to comply fully with the requirements of this lease; and

(c) to recompense any nonmineral applicant, entryman, purchaser under the Act of May 16, 1930 (46 Stat. 367), or patentee for all damages to crops or to tangible improvements caused by drilling or other prospecting operations, where any of the lands covered by this lease are embraced in any non-mineral application, entry, or patent under rights initiated prior to the date of this lease, with a reservation of the oil deposits, to the United States pursuant to the Act of July 17, 1914 (38 Stat. 509).

As to any lands covered by this lease within the area of any Government reclamation project, or in proximity thereto, the lessee shall take such precautions as required by the Secretary to prevent any injury to the lands susceptible to irrigation under such project or to the water supply thereof; *provided* that drilling is prohibited on any constructed works or right-of-way of the Bureau of Reclamation, and *provided, further*, that there is reserved to the lessor, its successors and assigns, the superior and prior right at all times to construct, operate, and maintain dams, dikes, reservoirs, canals, wasteways, laterals, ditches, telephone and telegraph lines, electric transmission lines, roadways, appurtenant irrigation structures, and reclamation works, in which construction, operation, and maintenance, the lessor, its successors and assigns, shall have the right to use any or all of the lands herein described without making compensation therefor, and shall not be responsible for any damage from the presence of water thereon or on account of ordinary, extraordinary, unexpected, or unprecedented floods. That nothing shall be done under this lease to increase the cost of, or interfere in any manner with, the construction, operation, and maintenance of such works. It is agreed by the lessee that, if the construction of any or all of said dams, dikes, reservoirs, canals, wasteways, laterals, ditches, telephone or telegraph lines, electric transmission lines, roadways, appurtenant irrigation structures or reclamation works across, over, or upon said lands should be made more expensive by reason of the existence of the improvements and workings of the lessee thereon, said additional expense is to be estimated by the

Secretary of the Interior, whose estimate is to be final and binding upon the parties hereto, and that within thirty (30) days after demand is made upon the lessee for payment of any such sums, the lessee will make payment thereof to the United States, or its successors, constructing such dams, dikes, reservoirs, canals, wasteways, laterals, ditches, telephone and telegraph lines, electric transmission lines, roadways, appurtenant irrigation structures, or reclamation works, across, over, or upon said lands; *provided, however*, that subject to advance written approval by the United States, the location and course of any improvements or works and appurtenances may be changed by the lessee; *provided, further*, that the reservations, agreements, and conditions contained in the within lease shall be and remain applicable notwithstanding any change in the location or course of said improvements or works of lessee. The lessee further agrees that the United States, its officers, agents, and employees, and its successors and assigns shall not be held liable for any damage to the improvements or workings of the lessee resulting from the construction, operation, and maintenance of any of the works hereinabove enumerated. Nothing in this paragraph shall be construed as in any manner limiting other reservations in favor of the United States contained in this lease.

THE LESSEE FURTHER AGREES That there is reserved to the lessor, its successors and assigns, the prior right to use any of the lands herein leased, to construct, operate, and maintain dams, dikes, reservoirs, canals, wasteways, laterals; ditches, telephone and telegraph lines, electric transmission lines, roadways, or appurtenant irrigation structures, and also the right to remove construction materials therefrom, without any payment made by the lessor or its successors for such right, with the agreement on the part of the lessee that if the construction of any or all of such dams, dikes, reservoirs, canals, wasteways, laterals, ditches, telephone and telegraph lines, electric transmission lines, roadways, or appurtenant irrigation structures across, over, or upon said lands or the removal of construction materials therefrom, should be made more expensive by reason of the existence of improvements or workings of the lessee thereon, such additional expense is to be estimated by the Secretary of the Interior, whose estimate is to be final and binding upon the parties hereto, and that within thirty (30) days after demand is made upon the lessee for payment of any such sums, the lessee will make payment thereof to the United States or its successors constructing such dams, dikes, reservoirs, canals, wasteways, laterals, ditches, telephone and telegraph lines, electric transmission lines, roadways, or appurtenant irrigation structures across, over, or upon said lands or removing construction materials therefrom. The lessee further agrees that the lessor, its officers, agents, and employees and its successors and assigns shall not be held liable for any damage to the improvements or workings of the lessee resulting from the construction, operation, and maintenance of any of the works herein above enumerated. Nothing contained in this paragraph shall be construed as in any manner limiting other reservations in favor of the lessor contained in this lease.

To insure against the contamination of the waters of the

Reservoir,

Project, State of

, the lessee agrees that

the following further conditions shall apply to all drilling and operations on lands covered by this lease, which lie

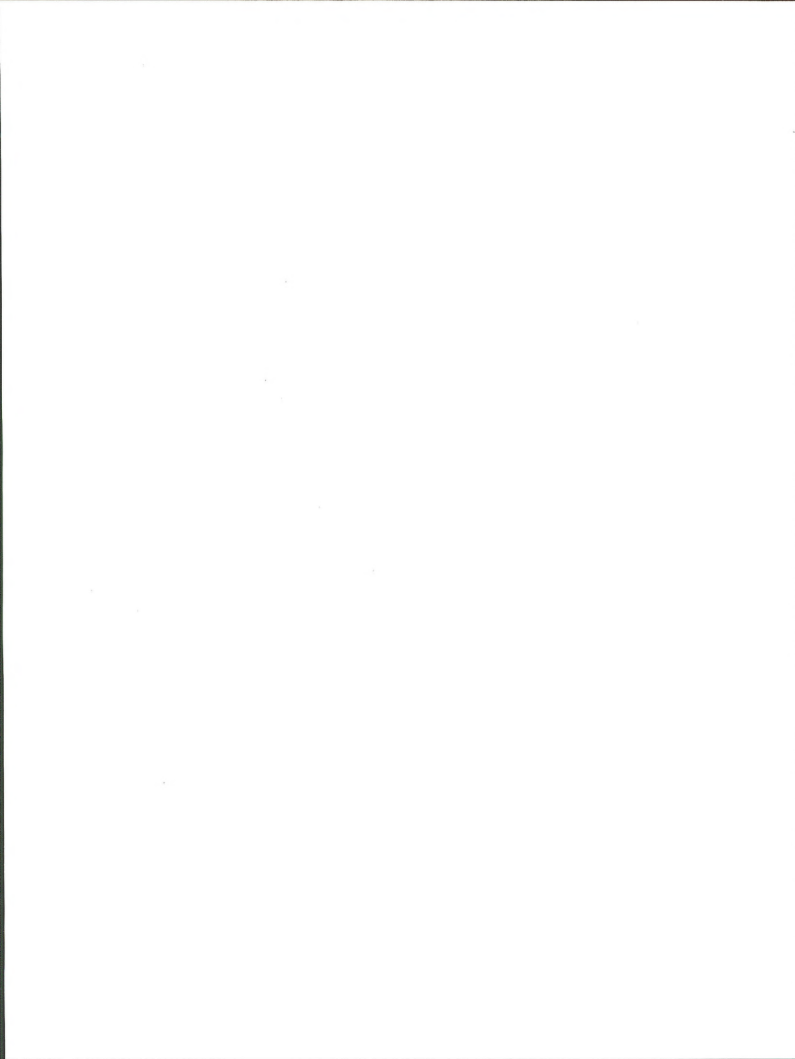
within the flowage or drainage area of the

Reservoir, as such area

is defined by the Bureau of Reclamation:

1. The drilling sites for any and all wells shall be approved by the Superintendent, Bureau of Reclamation, Project, before drilling begins. Sites for the construction of pipe-line rights-of-way or other authorized facilities shall also be approved by the Superintendent before construction begins.

2. All drilling or operation methods or equipment shall, before their employment, be inspected and approved by the Superintendent of the Project, , and by the Supervisor of the U. S. Geological Survey having jurisdiction over the area.



APPENDIX 4

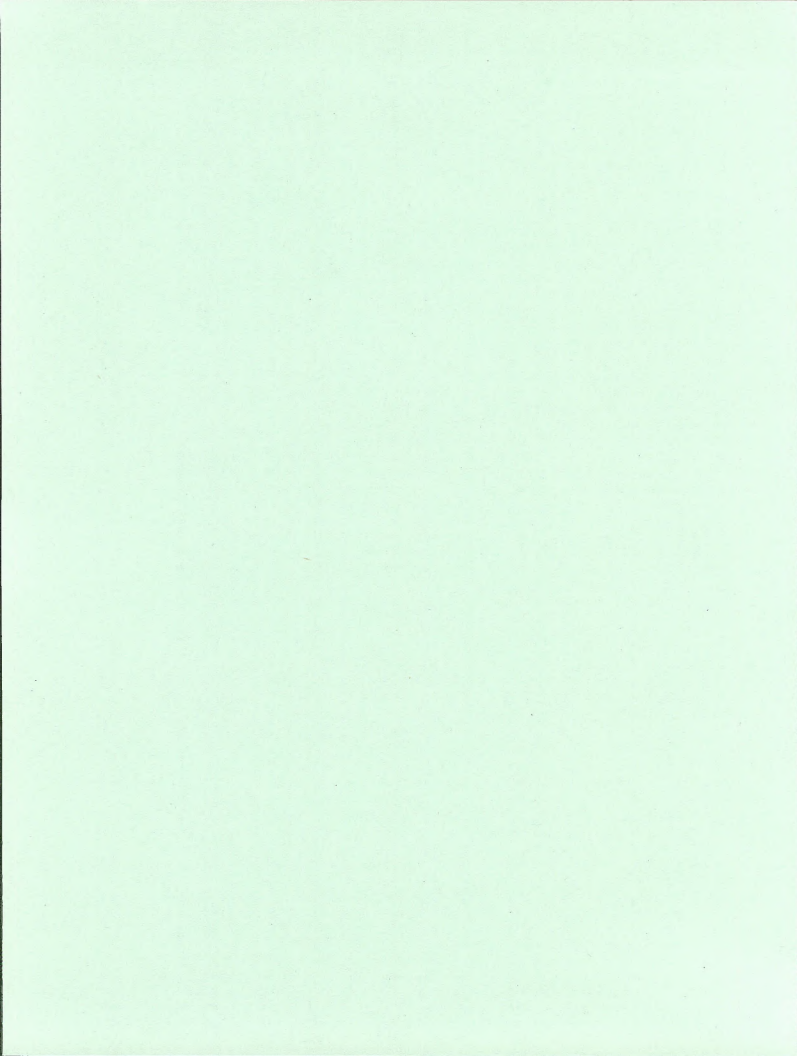
SPECIAL STATUS SPECIES OF TEXAS

FEDERALLY LISTED SPECIES PROTECTED A4-1

STATE LISTED SPECIES PROTECTED A4-3

**TEXAS NATURAL HERITAGE PROGRAM,
SPECIAL ANIMAL LIST - SPECIES OF CONCERN A4-7**

**TEXAS NATURAL HERITAGE PROGRAM,
SPECIAL PLANT LIST - SPECIES OF CONCERN A4-15**



FEDERALLY LISTED THREATENED & ENDANGERED SPECIES WHICH OCCUR IN TEXAS
(INCLUDING PROPOSED LISTINGS) (75) Updated 19 June 1995

Common Name *	Scientific Name	Status
PLANTS (27)		
ashy dogweed	<i>Thymophylla tephroleuca</i>	E
black lace cactus	<i>Echinocereus reichenbachii</i> var. <i>albertii</i>	E
bunched cory cactus	<i>Coryphantha ramillosa</i>	T
Chisos Mountain hedgehog cactus	<i>Echinocereus chisoensis</i> var. <i>chisoensis</i>	T
Davis' green pitaya	<i>Echinocereus viridiflorus</i> var. <i>davisi</i>	E
Hinkley's oak	<i>Quercus hinkleyi</i>	T
Johnston's frankenia	<i>Frankenia johnstonii</i>	E
large-fruited sand verbena	<i>Abronia macrocarpa</i>	E
Little Aguja pondweed	<i>Potamogeton clystocarpus</i>	E
Lloyd's hedgehog cactus	<i>Echinocereus lloydii</i>	E
Lloyd's mariposa cactus	<i>Echinomastus mariposensis</i>	T
Navasota ladies'-tresses	<i>Spiranthes parksii</i>	E
Nellie cory cactus	<i>Coryphantha minima</i>	E
slender rush-pea	<i>Hoffmannseggia tenella</i>	E
Sneed pincushion cactus	<i>Coryphantha sneedii</i> var. <i>sneedii</i>	E
South Texas ambrosia	<i>Ambrosia cheiranthifolia</i>	E
star cactus	<i>Astrophytum asterias</i>	E
Terlingua Creek cat's eye	<i>Cryptantha crassipes</i>	E
Texas ayenia	<i>Ayenia limitaris</i>	E
Texas prairie dawn	<i>Hymenoxys texana</i>	E
Texas poppy mallow	<i>Callirhoe scabriuscula</i>	E
Texas snowbells	<i>Syrax texana</i>	E
Texas trailing phlox	<i>Phlox nivalis</i> var. <i>texensis</i>	E
Texas wild-rice	<i>Zizania texana</i>	E w/CH
Tobusch fishhook cactus	<i>Ancistrocactus tobuschii</i>	E
Walker's manioc	<i>Manihot walkerae</i>	E
white bladderpod	<i>Lesquerella pallida</i>	E
CRUSTACEANS, ARACHNIDS, AND INSECTS (10)		
Bee Creek Cave harvestman	<i>Texella reddelli</i>	E
Bone Cave harvestman	<i>Texella reyesi</i>	E
Coffin Cave mold beetle	<i>Batrissodes texanus</i>	E
Comal Springs dryopid beetle	<i>Stygoparnus comalensis</i>	P/E
Comal Springs riffle beetle	<i>Heterelmis comalensis</i>	P/E
Kretschmarr Cave mold beetle	<i>Texamaurops reddelli</i>	E
Peck's cave amphipod	<i>Stygobromus pecki</i>	P/E
Tooth Cave ground beetle	<i>Rhadine persephone</i>	E
Tooth Cave pseudoscorpion	<i>Tartarocreagris texana</i>	E
Tooth Cave spider	<i>Neoleptoneta myopica</i>	E
FISHES (8)		
Arkansas River shiner	<i>Notropis girardi</i>	P/E
Big Bend gambusia	<i>Gambusia gaigei</i>	E
Clear Creek gambusia	<i>Gambusia heterochir</i>	E
Comanche Springs pupfish	<i>Cyprinodon elegans</i>	E
fountain darter	<i>Etheostoma fonticola</i>	E w/CH
Leon Springs pupfish	<i>Cyprinodon bovinus</i>	E w/CH
Pecos gambusia	<i>Gambusia nobilis</i>	E
San Marcos gambusia	<i>Gambusia georgei</i>	E w/CH

* see note at bottom of page 2

E = Endangered

T = Threatened

P/ = Proposed ...

CH = Critical Habitat (in Texas unless annotated ‡)

‡ = CH designated (or proposed) but outside Texas

Common Name *	Scientific Name	Status
AMPHIBIANS (4)		
Barton Springs salamander	<i>Eurycea sosorum</i>	P/E
Houston toad	<i>Bufo houstonensis</i>	E w/CH
San Marcos salamander	<i>Eurycea nana</i>	T □ w/CH
Texas blind salamander	<i>Typhlomolge rathbuni</i>	E
REPTILES (7)		
American alligator	<i>Alligator mississippiensis</i>	TSA
Concho water snake	<i>Nerodia paucimaculata</i>	T w/CH
green sea turtle	<i>Chelonia mydas</i>	E
hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E w/CH ‡
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	E
leatherback sea turtle	<i>Dermochelys coriacea</i>	E
loggerhead sea turtle	<i>Caretta caretta</i>	T
BIRDS (15)		
American peregrine falcon	<i>Falco peregrinus anatum</i>	E
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>	TSA
aplomado falcon	<i>Falco femoralis septentrionalis</i>	E
Attwater's prairie chicken	<i>Tympanuchus cupido attwateri</i>	E
bald eagle	<i>Haliaeetus leucocephalus</i>	E ◇
black-capped vireo	<i>Vireo atricapillus</i>	E
brown pelican	<i>Pelecanus occidentalis</i>	E
cactus ferruginous pygmy owl	<i>Glaucidium brasilianum cactorum</i>	P/T & □
golden-cheeked warbler	<i>Dendroica chrysoparia</i>	E
least tern	<i>Sterna antillarum</i>	T
Mexican spotted owl	<i>Strix occidentalis lucida</i>	T ‡
piping plover	<i>Charadrius melodus</i>	E
red-cockaded woodpecker	<i>Picoides borealis</i>	E
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E & P/CH ‡
whooping crane	<i>Grus americana</i>	E w/CH
MAMMALS (4)		
jaguarundi	<i>Felis yagouaroundi</i>	E
Louisiana black bear	<i>Ursus americanus luteolus</i>	T
Mexican long-nosed bat	<i>Leptonycteris nivalis</i>	E
ocelot	<i>Felis pardalis</i>	E

E = Endangered T = Threatened P/ = Proposed ... □ = with special rule
 TSA = Threatened due to similarity of appearance CH = Critical Habitat (in Texas unless annotated ‡)
 ‡ = CH designated (or proposed) outside Texas
 ◇ = bald eagle status west of 100° is Endangered, east of 100° is Endangered & Proposed as Threatened

* Note: This list does not include federally listed (nor proposed) threatened/endangered species which did occur in Texas historically but are thought to be extirpated (e.g., Mexican gray wolf, Rio Grande silvery minnow, & jaguar). Jaguar is listed for Mexico and proposed as endangered for Texas, New Mexico, and Arizona.

U.S. Fish and Wildlife Service, Ecological Services Field Office
 10711 Burnet Road, Suite 200, Austin, Texas 78758
 Phone (512) 490-0057

Updated 19 June 1995

TEXAS THREATENED AND ENDANGERED SPECIES

September, 1993

ANIMALS

In 1973 the Texas legislature authorized the Texas Parks and Wildlife Department to establish a list of endangered animals in the state. Endangered species are those species which the Executive Director of the Texas Parks and Wildlife Department has named as being "threatened with statewide extinction". Threatened species are those species which the TPW Commission has determined are likely to become endangered in the future. Laws and regulations pertaining to endangered or threatened animal species are contained in Chapters 67 and 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 - 65.184 of Title 31 of the Texas Administrative Code (T.A.C.).

PLANTS

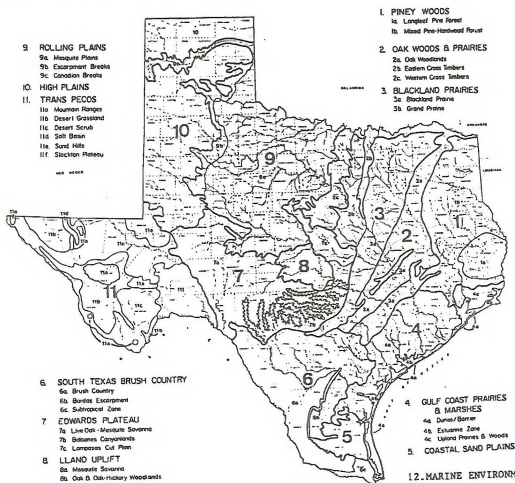
In 1988 the Texas legislature authorized the Department to establish a list of threatened and endangered plant species for the state. An endangered plant is one that is "in danger of extinction throughout all or a significant portion of its range". A threatened plant is one which is likely to become endangered within the foreseeable future. Laws and regulations pertaining to endangered or threatened plant species are contained in Chapter 88 of the TPW Code and Sections 69.01 - 69.14 of the T.A.C.

REGULATIONS

TPWD regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. State laws and regulations prohibit commerce in threatened and endangered plants and the collection of listed plant species from public land without a permit issued by TPWD. In addition, some species listed as threatened or endangered under state law are also listed under federal regulations. These animals are provided additional protection by the U.S. Fish and Wildlife Service.

LISTING AND RECOVERY

Listing and recovery of endangered species in Texas is coordinated by the Resource Protection Division. The Department's Legal Division is responsible for the issuance of permits for the handling of listed species. The following pages list those species which have been designated as threatened or endangered in Texas. The range of the species within the state can be referenced by the map of Texas natural regions below:



COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS	ECOREGIONS OF OCCURRENCE
***MAMMALS				
Bats				
MEXICAN LONG-NOSED BAT	LEPTONYCTERIS NIVALIS	E	LE	11
SOUTHERN YELLOW BAT	LASIURUS BOA	T		6
SPOTTED BAT	EUSERPES MACULATUM	T	C2	11
EASTERN BIG-EARED BAT	PLECOTUS RAFINESQUII	T	C2	1
Rodents				
TEXAS KANGAROO RAT	DIPDOMYS ELATOR	T	C2	9
COUES' RICE RAT	ORYZOMYS COUESI	T	C2	6
PALO DURO MOUSE	PEROMYSCUS TRUEI COMANCHE	T	C2	10
Marine Mammals				
GERRAITS' BEAKED WHALE	MESOPLODON EUROPAEUS	T		12
GOOSE-BEAKED WHALE	ZIPHIUS CAVIROSTRIS	T		12
PYGMY SPERM WHALE	KOGIA BREVICEPS	T		12
DWARF SPERM WHALE	KOGIA SIMUS	T		12
SPERM WHALE	PHYSETER CATODON	E	LE	12
ATLANTIC SPOTTED DOLPHIN	STENELLA PLAGIODON	T		12
ROUGH-TOOTHED DOLPHIN	STENO BREDAENENSIS	T		12
KILLER WHALE	ORCINUS ORCA	T		12
FALSE KILLER WHALE	PSEUDORCA CRASSIDENS	T		12
SHORT-FINNED PILOT WHALE	GLOBICEPHALA MACRORHYNCHUS	T		12
PYGMY KILLER WHALE	FERESA ATTENUATA	T		12
FINBACK WHALE	BALAENOPTERA PHYSALUS	E	LE	12
BLUE WHALE	BALAENOPTERA MUSCULUS	E	LE	12
BLACK RIGHT WHALE	EUBALAENA GLACIALIS	E	LE	12
MANATEE	TRICHECHUS MANATUS	E	LE	(4,12)
Carnivores				
RED WOLF	CANIS RUFUS	E	LE	(1-4,7)**
GRAY WOLF	CANIS LUPUS	E	LE	(6-11)
MEXICAN WOLF	CANIS LUPUS BAILEYI	E	LE	(11)
BLACK BEAR	URSUS AMERICANUS	E		(1,2,4,6-8),11
LOUISIANA BLACK BEAR	URSUS AMERICANUS LUTEOLUS	E	LT	(1)
COATI	NASUA NASUA	E		4,6,7,11
BLACK-FOOTED FERRET	MUSTELA NIGRIPES	E	LE	(9-11)**
OTELOT	FELIS PARDALIS	E	LE	(4),6
MARGAY	FELIS WIEDII	E	LE	(6)
JAGUARUNDI	FELIS VAGUAROUDI	E	LE	(4),6
JAGUAR	PANTHERA ONCA	E		(6,11)
***BIRDS				
Waterbirds				
BROWN PELICAN	PELECANUS OCCIDENTALIS	E	LE	4
REDDISH EGRET	EGRETTA RUFESCENS	T	C2	4
WHITE-FACED IBIS	PLEGALIS CHIHUI	T	C2	2-11
WOOD STORK	MYCTERIA AMERICANA	T		1,2,4,6
WHOOPIING CRANE	GRUS AMERICANA	E	LE	4
Raptors				
AMERICAN SWALLOW-TAILED KITE	ELANOIDES FORFICATUS	T	3c	1,4
BALD EAGLE	HALIAEETUS LEUCOCEPHALUS	E	LE	1-4,7-11
COMMON BLACK-HAWK	BUTEO CALLUS ANTHRACINUS	T		6,11
NORTHERN GRAY HAWK	BUTEO NITIDUS MAXIMUS	T	C2	6
WHITE-TAILED HAWK	BUTEO ALBICAUDATUS	T		4-6
ZONE-TAILED HAWK	BUTEO ALBONOTATUS	T		6,7
NORTHERN APLOMADO FALCON	FALCO FEMORALIS SEPTENTRIONALIS	E	LE	6
AMERICAN PEREGRINE FALCON	FALCO PEREGRINUS ANATUM	E		7-11
ARCTIC PEREGRINE FALCON	FALCO PEREGRINUS TUNDRIUS	T	LT	4
FERRUGINOUS PYGMY-OWL	GLAUCIDIDIUM BRASILIANUM	T	C2	6
MEXICAN SPOTTED OWL	STRIX OCCIDENTALIS LUCIDA	LT		11
Shorebirds				
PIPING PLOVER	CHARADRIUS MELODUS	T	LT	4
ESKIMO CURLEW	NUMENIUS BOREALIS	E	LE	4
ROSEATE TERN	STERNA DOUGALLII	E	LT	4
INTERIOR LEAST TERN	STERNA ANTILLARUM ATHALASSOS	E	LE	6,9
SOOTY TERN	STERNA FUSCATA	T		4
Upland Birds				
ATTWATER'S PRAIRIE-CHICKEN	TYMPANUCHUS CUPIDO ATTWATERI	E	LE	4
Woodpeckers				
RED-CKOADED WOODPECKER	PICOIDES BOREALIS	E	LE	1
IVORY-BILLED WOODPECKER	CAMPEPHILUS PRINCIPALIS	E	LE	(1)
Songbirds				
NORTHERN BEARDESS-TYRANNULET	CAMPOTOSTOMA IMBERBE	T		6
ROSE-THROATED BECARD	PACHYRAMPHUS AGLAIAE	T		6
BLACK-CAPPED VIREO	VIREO ATRICAPILLUS	E	LE	7,11
BACHMAN'S WARBLER	VERMIVORA BACHMANII	LE		(1)
TROPICAL PARULA	PARULA PITTAUMI NIGRILORA	T	C2	6
GOLDEN-CHEEKED WARBLER	DENDROICA CHRYSOPARIA	E	LE	7
BACHMAN'S SPARROW	AIMOPHILA AESTIVALIS	T	C2	1
TEXAS BOTTERI'S SPARROW	AIMOPHILA BOTTERII TEXANA	T	C2	4

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS	ECOREGIONS OF OCCURRENCE
***REPTILES				
Turtles				
LOGGERHEAD SEA TURTLE	CARETTA CARETTA	E	LT	12
GREEN TURTLE	CHELONIA MYDAS	T	LT	12
HAWSBILL SEA TURTLE	ERETMOCHELYS IMBRICATA	E	LE	12
KEMP'S RIDLEY SEA TURTLE	LEPIDOCHELYS KEMPII	E	LE	12
ALLIGATOR SNAPPING TURTLE	MACROCHELYS TEMMINCKII	T	C2	1-4
LEATHERBACK SEA TURTLE	DERMOCHELYS CORIACEA	E	LE	12
CHIHUAHUA MUD TURTLE	KINOSTERNON HIRTIPES MURRAYI	E	C2	11
TEXAS TORTOISE	GOPHERUS BERLANDIERI	T		4-6
Lizards				
RETICULATED GECKO	COLEONYX RETICULATUS	T	3C	11
RETICULATE COLLARED LIZARD	CROTAPHYTUS RETICULATUS	T	C2	6
TEXAS HORNED LIZARD	PHRYNOSOMA CORNUTUM	T	C2	2-11
MOUNTAIN SHORT-HORNED LIZARD	PHRYNOSOMA DOUGLASSII HERNANDESI	T		11
Snakes				
NORTHERN SCARLET SNAKE	CEMOPHORA COCCINEA COPEI	T		1, 4
TEXAS SCARLET SNAKE	CEMOPHORA COCCINEA LINERI	T		4-6
BLACK-STRIPED SNAKE	CONIOPHANES IMPERIALIS	T		6
INDIGO SNAKE	DRYMARCHON CORAIS	T		4-7
SPECKLED RACER	DRYMOBIUS MARGARITIFERUS	E		6
NORTHERN CAT-EYED SNAKE	LEPTODEIRA SEPTENTRIONALIS	E		4
BRAZOS WATER SNAKE	SEPTENTRIONALIS			
CONCHO WATER SNAKE	NERODIA HARTERI	T	C2	2, 9
SMOOTH GREEN SNAKE	NERODIA HARTERI PAUCINACULATA	E	LT	8, 9
LOUISIANA PINE SNAKE	OPHEODRYS VERNALIS	E		4
BIG BEND BLACKHEAD SNAKE	PITUOPHIS MELANOLEUCUS RUTHVENI	E	C2	1
TEXAS LYRE SNAKE	TANTILLA RUBRA	T		7, 11
TIMBER RATTLESNAKE	TRIMORPHODON BISCUTATUS VILKINSONI	T		11
	CROTALUS HORRIDUS	T		1-4
***AMPHIBIANS				
Salamanders				
SAN MARCOS SALAMANDER	EURYCEA NANA	T	LT	7
COMAL BLIND SALAMANDER	EURYCEA TRIDENTIFERA	T	C2	7
TEXAS BLIND SALAMANDER	TYPHLOMOLGE RATHBUNI	E	LE	7
BLANCO BLIND SALAMANDER	TYPHLOMOLGE ROBUSTA	E	C2	7
CASCADE CAVERNS SALAMANDER	EURYCEA LATITANS	T		7
BLACK-SPOTTED NEWT	NOTOPHTHALMUS MERIDIONALIS	E	C2	4, 5, 6
RIO GRANDE LESSER SIREN	SIREN INTERMEDIA TEXANA	E	C2	4, 5, 6
Frogs and Toads				
HOUSTON TOAD	BUFO HOUSTONENSIS	E	LE	2, 4
MEXICAN TREEFROG	SMILISCIA BAUDINI	T		6
WHITE-LIPPED FROG	LEPTODACTYLUS LABIALIS	E		6
SHEEP FROG	HYPOPACHUS VARIOLOSUS	T		5, 6
MEXICAN BURROWING TOAD	RHINOPHYRUS DORSALIS	T		6
***FISHES				
Large River Fish				
SHOVELNOSE STURGEON	SCAPHIRHYNCHUS PLATYRINCHUS	E		1
PADDLEFISH	POLYODON SPATHULA	E	C2	1
Minnows				
MEXICAN STONEROLLER	CAMPOTOMA ORNATUM	T	C2	11
PROSERPINE SHINER	CYPRINELLA PROSERPINA	T	C2	7, 11
DEVIL'S RIVER MINNOW	DIONDA DIABOLI	T	C1	7
RIO GRANDE CHUB	GILA PANDORA	T		11
RIO GRANDE SILVERY MINNOW	HYBOGNATHUS AMARUS		PE	(11)
CHIHUAHUA SHINER	NOTROPIS CHIHUAHUA	T	C2	11
BLUEHEAD SHINER	NOTROPIS HUBBSI	T		11
BLUNTNOSE SHINER	NOTROPIS SIMUS	E		(11)*
PHANTOM SHINER	NOTROPIS ORCA	E	3A	(6, 7, 11)
Suckers				
BLUE SUCKER	CYCLEPTUS ELONGATUS	T	C2	1-4, 6, 7
CREEK CHUBSUCKER	ERIMYZON OBLONGUS	T		1
Catfish				
WIDEMOUTH BLINDCAT	SATAN EURYSTOMUS	T	C2	7
TOOTHLESS BLINDCAT	TROGLOCLANIS PATTERSONI	T	C2	7
Killifishes				
LEON SPRINGS PUPFISH	CYPRINODON BOVINUS	E	LE	11
COMANCHE SPRINGS PUPFISH	CYPRINODON ELEGANS	E	LE	11
CONCHOS PUPFISH	CYPRINODON EXIMUS	T	C2	11
PECOS PUPFISH	CYPRINODON PECOSSENSIS	T	C1	11
Livebearers				
BIG BEND GAMBUSIA	GAMBUSIA GAIGEI	E	LE	11
SAN MARCOS GAMBUSIA	GAMBUSIA GEORGEI	E	LE	(7)*
CLEAR CREEK GAMBUSIA	GAMBUSIA HETEROCHIR	E	LE	8
PECOS GAMBUSIA	GAMBUSIA NOBILIS	E	LE	11
BLOTCHED GAMBUSIA	GAMBUSIA SENILIS	E	C2	(7, 11)**
Perches				
FOUNTAIN DARTER	ETHEOSTOMA FONTICOLA	E	LE	7
RIO GRANDE DARTER	ETHEOSTOMA GRAHAMI	T	C2	7, 11
BLACKSIDE DARTER	PERCINA MACULATA	T		1
Coastal Fishes				
OPPOSUM PIPEFISH	MICROPHIS BRACHYURUS	T		12
RIVER GOBY	AMAGUS TAJASICA	T		4, 4, 25
BLACKFIN GOBY	GOSIOMELLUS ATRIPINNIS	E		6, 12

COMMON NAME	SCIENTIFIC NAME	STATE STATUS	FEDERAL STATUS	ECOREGIONS OF OCCURRENCE
***INVERTEBRATES				
	Spiders			
TOOTH CAVE PSEUDOSCORPION	TARTAROCREAGRIS TEXANA		LE	7
TOOTH CAVE SPIDER	NEOLEPTONETA MYOPICA		LE	7
BEE CREEK CAVE HARVESTMAN	TEXELLA REDDELLI		LE	7
BONE CAVE HARVESTMAN	TEXELLA REYESI		LE	7
	Insects			
TOOTH CAVE GROUND BEETLE	RHADINE PERSEPHONE		LE	7
KRETSCHMARR CAVE MOLD BEETLE	TEXAMAUROPS REDDELLI		LE	7
COFFIN CAVE MOLD BEETLE	BATRISODES TEXANUS		LE	7
***PLANTS				
	Cacti			
TOBUSCH FISHHOOK CACTUS	ANCISTROCACTUS TOBUSCHII	E	LE	7
NELLIE CORY CACTUS	CORYPHANTHA MINIMA	E	LE	11
BUNCHED CORY CACTUS	CORYPHANTHA RAMILLOSA	T	LT	11
SNEED PINCUSHION CACTUS	CORYPHANTHA SNEEDII VAR SNEEDII	E	LE	11
LLOYD'S HEDGEHOG CACTUS	ECHINOCEREUS LLOYDII	E	LE	11
BLACK LACE CACTUS	ECHINOCEREUS REICHENBACHII VAR ALBERTII	E	LE	4-6
DAVIS' GREEN PITAYA	ECHINOCEREUS VIRIDIFLORUS VAR DAVISII	E	LE	11
CHISOS HEDGEHOG CACTUS	ECHINOCEREUS CHISOENSIS VAR CHISOENSIS	T	LT	11
LLOYD'S MARIPOSA CACTUS	NEOLLOYDIA MARIPOSENSIS	T	LT	11
STAR CACTUS	ASTROPHYTUM ASTERIAS		PE	6
	Trees, Shrubs, and Sub-shrubs			
HINCKLEY'S OAK	QUERCUS HINCKLEYI	T	LT	11
JOHNSTON'S FRANKENIA	FRANKENIA JOHNSTONII	E	LE	6
TEXAS SNOWBELLS	STYRAX TEXANA	E	LE	7
	Wildflowers			
ASHY DOGWEED	THYMOPHYLLA TEPHROLEUCA	E	LE	6
PRAIRIE DAWN	HYMENOXYS TEXANA	E	LE	4
TERLINGUA CREEK CAT'S-EYE	CRYPTANTHA CRASSIPES	E	LE	11
WHITE BLADDERPOD	LESQUERELLA PALLIDA	E	LE	1
WALKER'S MANIOC	MANIHOT WALKERAE	E	LE	6
SLENDER RUSH-PEA	HOFFMANNSEGGLIA TENELLA	E	LE	4, 6
MCKITTRICK PENNYROYAL	HELEOMA APICULATUM	T	LT	11
TEXAS POPPY-YALLOW	CALLIRHOE SCABRIUSCULA	E	LE	9
LARGE-FRUITED SAND VERBENA	ABRONIA MACROCARPA	E	LE	2
TEXAS TRAILING PHLOX	PHLOX NIVALIS SSP TEXENSIS	E	LE	1
CHAFFSEED	SCHWALBEA AMERICANA		LE	?
SOUTH TEXAS RAGWEED	AMERSONIA CHEIRANTHIFOLIA		PE	4, 6
TEXAS AVENIA	AVENIA LIMITARIS		PE	6
	Grasses and Grass-like Plants			
TEXAS WILD-RICE	ZIZANIA TEXANA	E	LE	7
LITTLE AGUJA PONDWEED	POTAMOGETON CLYSTOCARPUS	E	LE	11
	Orchids			
NAVASOTA LADIES'-TRESSES	SPIRANTHES PARKSII	E	LE	1-2

KEY:

State Status - E=Endangered, T=Threatened
 Federal Status - LE=Listed Endangered, LT=Listed Threatened
 PE=Proposed Endangered, PT=Proposed Threatened
 C1=Candidate Species (category 1 - awaiting listing)
 C2=Candidate Species (category 2 - awaiting more information)
 3A=Removed from list due to extinction
 3B=Removed from list due to taxonomic change
 3C=Removed from list because of abundance
 Ecoregion - ()=Species extirpated from ecoregion within Texas
 A4=Species extinct
 ***=Species extinct in the wild (except some experimental populations)

In 1983, the Texas Legislature created the Special Nongame and Endangered Species Conservation Fund. This fund may be used for nongame wildlife and endangered species research and conservation, habitat acquisition and development, and dissemination of information pertaining to these species. Money for the fund is obtained through private donations and sale of nongame wildlife art prints, decals and stamps. For more information on the fund or endangered species call 1-800-792-1112 or 512-448-4311.

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
SPECIAL ANIMAL LIST
19 OCT 1993

PAGE 1.

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
*** AMPHIBIANS					
BUFO HOUSTONENSIS	HOUSTON TOAD	G1	S1	LE	E
EURYCEA NANA	SAN MARCOS SALAMANDER	G1	S1	LT	T
EURYCEA NEOTENES	TEXAS SALAMANDER	G3	S3	C2	
EURYCEA SOSORUM	BARTON SPRINGS SALAMANDER	G1	S1	C2	
EURYCEA SP 1	JOLLYVILLE PLATEAU SALAMANDER	G1	S1	C2	
EURYCEA SP 2	SALADO SPRINGS SALAMANDER	G1	S1	C2	
EURYCEA SP 4	BUTTERCUP CREEK CAVES SALAMANDER	G1	S1	C2	
EURYCEA SP 5	GEORGETOWN SALAMANDER	G1	S1	C2	
EURYCEA TRIDENTIFERA	COMAL BLIND SALAMANDER	G1	S1	C2	T
HYPOPACHUS VARIOLOSUS	SHEEP FROG	G5	S2		
LEPTODACTYLUS LABIALIS	WHITE-LIPPED FROG	G5	S1		E
NOTOPHTHALMUS MERIDIONALIS	BLACK-SPOTTED NEWT	G1	S1	C2	E
PLETHODON SERRATUS	SOUTHERN REDBACK SALAMANDER	G5	S1		
RANA GRYLIO	PIG FROG	G5	S2		
RANA PIPIENS	NORTHERN LEOPARD FROG	G5	S1		
RHINOPHYRUS DORSALIS	MEXICAN BURROWING TOAD	G5	S2		T
SIREN INTERMEDIA TEXANA	RIO GRANDE LESSER SIREN	G5T2Q	S2	C2	E
SMILISCIA BAUDINI	MEXICAN TREEFROG	G5	S3		E
TYPHLOMOLGE RATHBUNI	TEXAS BLIND SALAMANDER	G1	S1	LE	E
TYPHLOMOLGE ROBUSTA	BLANCO BLIND SALAMANDER	G1	S1	C2	E
*** ARACHNIDS					
ARCHEOLARCA GUADALUPENSIS	GUADALUPE CAVE PSEUDOSCORPION	G1	S1	C2	
NEOLETEONETA MYOPICA	TOOTH CAVE SPIDER	G1	S1	LE	
TARTAROCREAGRIS TEXANA	TOOTH CAVE PSEUDOSCORPION	G1	S1	LE	
TEXELLA REDDELLI	BEE CREEK CAVE HARVESTMAN	G1	S1	LE	
TEXELLA REYESI	BONE CAVE HARVESTMAN	G1Q	S1	LE	
*** BIRDS					
ACCIPITER GENTILIS	NORTHERN GOSHAWK	G4	SA	C2	
AIMOPHILA AESTIVALIS	BACHMAN'S SPARROW	G3	S2	C2	T
AIMOPHILA BOTTERII TEXANA	TEXAS BOTTERII'S SPARROW	G4TU	S3	C2	T
AMMODRAMUS BAIRDII	BAIRD'S SPARROW	G3	S7	C2	
AMMODRAMUS HENSLOWII	HENSLOW'S SPARROW	G4	S1	C2	
AREHOMOPUS RUFIVIRGATUS RUFIVIRGATUS	TEXAS (=SENNETT'S) OLIVE SPARROW	G5T3	S3	C2	
BUTEO ALCAUDATUS	WHITE-TAILED HAWK	G5	S2		T
BUTEO ALBONOTATUS	ZONE-TAILED HAWK	G5	S3		
BUTEO NITIDUS MAXIMUS	NORTHERN GRAY HAWK	G5T5	S2	C2	T
BUTEO REGALIS	FERRUGINOUS HAWK	G4	S3	C2	
BUTEOGALLUS ANTHRACINUS	COMMON BLACK-HAWK	G5	S2		T
CAMPEPHILUS PRINCIPALIS	IVORY-BILLED WOODPECKER	G1	SX	LE	E
CAMPSTOMA IMBERBE	NORTHERN BEARDLESS-TYRANNULET	G5	S3		T
CHARADRIUS ALEXANDRINUS	SNOWY PLOVER	G4	S2	C2	
CHARADRIUS ALEXANDRINUS NIVOSUS	WESTERN SNOWY PLOVER	G4T3	S2	C2	
CHARADRIUS ALEXANDRINUS TENUIROSTRIS	SOUTHEASTERN SNOWY PLOVER	G4TU	S2	C2	
CHARADRIUS MELODUS	PIPING PLOVER	G3	S2	LT	T
CHARADRIUS MONTANUS	MOUNTAIN PLOVER	G3	S2	C1	
CHLIDONIAS NIGER	BLACK TERN	G4	S7	C2	
CHONDOHIERAX UNCINATUS	HOOK-BILLED KITE	G5	S2		
DENDROICA CERULEA	CERULEAN WARBLER	G5	S3	C2	
DENDROICA CHRYSOPARIA	GOLDEN-CHEEKED WARBLER	G2	S2	LE	E
EGRETTA RUFESCENS	REDDISH EGRET	G4	S2	C2	T
ELANOIDES FORFICATUS	AMERICAN SWALLOW-TAILED KITE	G5	S2	3C	T
EMPIDONAX TRILLII EXIMUS	SOUTHWESTERN WILLOW FLYCATCHER	G5T7	S1	C1	
FALCO FERRALIS SEPTENTRIONALIS	NORTHERN APLOMADO FALCON	G4T2	S1C	LE	E
FALCO PEREGRINUS ANATUM	AMERICAN PEREGRINE FALCON	G3T2	S2	LE	E
FALCO PEREGRINUS TUNDRIUS	ARCTIC PEREGRINE FALCON	G3T2	S2	LT	T
GEOTHPYIS TRICHAS INSUPERATA	BROWNSVILLE COMMON YELLOWTHROAT	G5T2	S2	C2	
GLAUCIDIUM BRASILIANUM	FERRUGINOUS PYGMY-OWL	G5	S3		T
GLAUCIDIUM BRASILIANUM CACTORUM	CACTUS FERRUGINOUS PYGMY-OWL	G5TU	S3	C1	T
GRUS AMERICANA	WHOOPIING CRANE	G1	S1	LE	E

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HALIAEETUS LEUCOCEPHALUS	BALD EAGLE	G3	S2	LE	E
ICTERUS CUCULLATUS CUCULLATUS	MEXICAN HOODED ORIOLE	G5TU	S4	C2	
ICTERUS CUCULLATUS SEWNETTI	SEWNETT'S HOODED ORIOLE	G5TU	S4	C2	
ICTERUS GRADICAUDA AUDUBONII	AUDUBON'S ORIOLE	G5T4	S4	C2	
LANIUS LUDOVICIANUS	LOGGERHEAD SHRIKE	G4	S4	C2	
LANIUS LUDOVICIANUS MIGRANS	MIGRANT LOGGERHEAD SHRIKE	G4T2	S2	C2	
LATERALLUS JAMAICENSIS	BLACK RAIL	G4?	S2	C2	
MYCTERIA AMERICANA	WOOD STORK	G5	SN		T
NUMENIUS BOREALIS	ESKIMO CURLEW	G1	S1	LE	E
PACHYRAMPHUS AGLAIAE	ROSE-THROATED BECARD	G4G5	S2		T
PARULA PITIAYUMI NIGRILORA	TROPICAL PARULA	G5TU	S3	C2	T
PELECANUS OCCIDENTALIS	BROWN PELICAN	G5	S2	LE	E
PICOIDES BOREALIS	RED-COCKADED WOODPECKER	G2	S2	LE	E
PLEGADIS CITHI	WHITE-FACED IBIS	G5	S2	C2	T
STERNA ANTILLARUM	LEAST TERN	G4	S?	LE	
STERNA ANTILLARUM ATHALASSOS	INTERIOR LEAST TERN	G4T2	S1	LE	E
STERNA DOUGALLII DOUGALLII	ROSEATE TERN	G3T?	SN	LT	
STERNA FUSCATA	SOOTY TERN	G5	S2		T
STRIX OCCIDENTALIS LUCIDA	MEXICAN SPOTTED OWL	G3T3	S1	LT	
TYMPANUCHUS CUPIDO ATTWATERI	ATTWATER'S PRAIRIE-CHICKEN	G4T1	S1	LE	E
TYMPANUCHUS PALLIDICINCTUS	LESSER PRAIRIE-CHICKEN	G3	S3		
VERMIVORA BACHMANII	BACHMAN'S WARBLER	G1	SN		
VERMIVORA CRISSALIS	COLIMA WARBLER	G3?	S3	3C	
VIREO ATRICAPILLIS	BLACK-CAPPED VIREO	G2G3	S2	LE	E
*** CRUSTACEANS					
ASELLUS SMITHII	TEXAS TROGLOBITIC WATER SLATER	G1	S1		
CAMBARILLUS TEXANUS	A CRAYFISH	G3?	S3?		
FALLICAMBARUS DEVASTATOR	TEXAS PRAIRIE CRAYFISH	G2?	S2?		
GAMMARUS HYALLELOIDES	DIMINUTIVE AMPHIPOD	G1	S1		
GAMMARUS PECOS	PECOS AMPHIPOD	G1	S1	C2	
HYALLELLA TEXANA	CLEAR CREEK AMPHIPOD	G1	S1		
HONODILLA TEXANA		G1	S1		
ORCONECTES MALETAE	A CRAYFISH	G2	S1?		
PALAEONETES ANTHORUM	TEXAS CAVE SHRIMP	G1	S1	C2	
PROCAMBARUS TEXANUS	A CRAYFISH	G1	S?		
STYGOBROMUS BALCONIUS	BALCONES CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS BIFURCATUS	BIFURCATED CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS DEJECTUS	CASCADE CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS FLAGELLATUS	EZELL'S CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS HADENOECUS	DEVIL'S SINKHOLE AMPHIPOD	G1	S1	C2	
STYGOBROMUS LONGIPES	LONG-LEGGED CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS PECKI	PECK'S CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS REDDELLI	REDDELL'S CAVE AMPHIPOD	G1	S1	C2	
STYGOBROMUS RUSSELLI	AN AMPHIPOD	G3	S3		
*** FISHES					
AWAOUS TAJASICA	RIVER GOBY	G5	S1		T
CAMPOSTOMA ORNATUM	MEXICAN STONEROLLER	G3	S1	C2	T
CYCLEPTUS ELONGATUS	BLUE SUCKER	G4	S3	C2	T
CYPRINELLA PROSERPINA	PROSERPINE SHINER	G3	S2	C2	T
CYPRINODON BOVINUS	LEON SPRINGS PUFFFISH	G1	S1	LE	E
CYPRINODON ELEGANS	COMANCHE SPRINGS PUFFFISH	G1	S1	LE	E
CYPRINODON EXIMIUS	CONCHOS PUFFFISH	G4	S1	C2	T
CYPRINODON PECOSSENSIS	PECOS PUFFFISH	G1	S1	C1	T
DIONDA DIABOLI	DEVIL'S RIVER MINNOW	G2	S1	C1	T
ERIMYZON OBLONGUS	CREEK CHUBSUCKER	G5	S2S3		T
ETHEOSTOMA FONTICOLA	FOUNTAIN DARTER	G1	S1	LE	E
ETHEOSTOMA GRAHAMI	RIO GRANDE DARTER	G3	S2	C2	T
GAMBUSIA GAIGEI	BIG BEND GAMBUSIA	G1	S1	LE	E
GAMBUSIA GEORGEI	SAN MARCOS GAMBUSIA	GX	SX	LE	E
GAMBUSIA HETEROCHIR	CLEAR CREEK GAMBUSIA	G1	S1	LE	E
GAMBUSIA NOBILIS	PECOS GAMBUSIA	G2	S2	LE	E

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GAMBUSIA SENILIS	BLOTCHED GAMBUSIA	G4	SX	C2	E
GILA PANDORA	RIO GRANDE CHUB	G3	S1		T
GOBIONELLUS ATRIPINNIS	BLACKFIN GOBY	G3	S1		E
HYBOGNATHUS AMARUS	RIO GRANDE SILVER MINNOW	G1	SX	PE	
ICTALURUS LUPUS	HEADWATER CATFISH	G3	S2	3C	
MACRHYBOPSIS AESTIVALIS TETRAMEMUS	ARKANSAS RIVER SPECKLED CHUB	G5T5	S5	C2	
MICROPHIS BRACHYURUS	OPPOSUM PIPEFISH	G5	S1		T
MICROPTERUS TRECULI	GUADALUPE BASS	G3	S3	C2	
MOXOSTOMA AUSTRINUM	WEST MEXICAN REDHORSE	G3	S1		
NOTROPIS BUCCOLA	SMALLEYE SHINER	G2	S2	C2	
NOTROPIS CHIHUAHUA	CHIHUAHUA SHINER	G3	S2	C2	T
NOTROPIS GIRARDI	ARKANSAS RIVER SHINER	G2	S2	C1	
NOTROPIS HUBBSI	BLUEHEAD SHINER	G3	S1		T
NOTROPIS JEMEZANUS	RIO GRANDE SHINER	G3	S3	C2	
NOTROPIS ORCA	PHANTOM SHINER	GX	SX	3A	E
NOTROPIS OXYRHYNCHUS	SHARPHOSE SHINER	G3	S3	C2	
NOTROPIS SIMUS	BLUNTNOSE SHINER	G2	SX		E
PERCINA MACULATA	BLACKSIDE DARTER	G5	S1		T
POLYODON SPATHULA	PADDLEFISH	G4	S3	C2	E
SATAN EURYSTOMUS	WIDEMOUTH BLINDCAT	G1	S1	C2	T
SCAPHIRHYNCHUS PLATORYNCHUS	SHOVELNOSE STURGEON	G4	S2		E
SYNGNATHUS AFFINIS	TEXAS PIPEFISH	G1	S1		
TROGLOGLANIS PATTERSONI	TOOTHLESS BLINDCAT	G1	S1	C2	T

*** INSECTS

ADHEMARIUS BLANCHARDORUM	BLANCHARDS' SPINX MOTH	G7	S7	C2	
AESNA DUGESI	ARROYO DARNER	G3	S7		
AMBLYCHILIA PICOLMINII	A TIGER BEETLE	G3	S7		
ANOMALA TIBIALIS	TIBIAL SCARAB BEETLE	GH	SH	C2*	
APODEMIA CHISOSENSIS	CHISOS METALMARK	G1G3	S7		
ARGIA SP 1	BALMORHEA DAMSELFLY	G2G3	S1S2	C2	
ASAPHOMYIA TEXANUS	TEXAS ASAPHOMYIAN TABANID FLY	GH	SH	C2*	
BATRISOIDES TEXANUS	COFFIN CAVE MOLD BEETLE	G1	S1	LE	
CALEPHELIS FREEMANI	FREEMAN'S METALMARK	GH	SH		
CALEPHELIS RAWSONI	RAWSON'S METALMARK	G3?	S7		
CHEUMATOPSYCHE FLINTI	FLINT'S NET-SPINNING CADDISFLY	G1G3	S1S3	C2	
CICINDELA CAZIERI	CAZIER'S TIGER BEETLE	GU	SH	C2*	
CICINDELA CHLOROCEPHALA SMYTHI	SMYTH'S TIGER BEETLE	GHTH	SH	C2*	
CICINDELA HORNII	A TIGER BEETLE	G3	S7		
CICINDELA NEVADICA OLMOA	LOS OLMOA TIGER BEETLE	G5T3	S1S3	C2	
CICINDELA NIGROCOERULEA SUBTROPICA	SUBTROPICAL BLUE-BLACK TIGER BEETLE	G5T2	SH	C2	
CICINDELA OBSOLETA NEOJUVENILIS	NEOJUVENILE TIGER BEETLE	G5T1	SH	C2*	
CICINDELA POLITULA BARBARANNAE	BARBARA ANN'S TIGER BEETLE	G5T3	S7	C2	
CICINDELA POLITULA PETROPHILA	GUADALUPE MOUNTAINS TIGER BEETLE	G5T3	S7	C2	
CYLINDROPSPIS SP 1	TOOTH CAVE BLIND ROVE BEETLE	G1	S1	3A	
DERONECTES NEOMEXICANA	BONITA DIVING BEETLE	G7	S7	C2	
EXIMACRIS SUPERBUM	SUPERB GRASSHOPPER	GH	SH	C2*	
FIXSENTIA POLINGI	POLING'S HAIRSTREAK	G1	S7		
GOMPHUS MODESTUS	GULF COAST CLUBTAIL	G3	S7		
HAIDEOPORUS TEXANUS	EDWARDS AQUIFER WATER BEETLE	G1	S1	C2	
HALIPLUS NITENS	DISJUNCT CRAWLING WATER BEETLE	GH	SH	C2*	
HETERELMIS COMALENSIS	COMAL SPRINGS WATER BEETLE	G1	S1	C2	
LIBELLULA COMPOSITA	BLEACHED SKIMMER	G3	S7		
LIMNIBES TEXANUS	TEXAS MINUTE MOSS BEETLE	GH	SH	C2	
LORDITHON NIGER	BLACK LORDITHON ROVE BEETLE	G7	SH	C2	
MACROMIA WABASHENSIS	WABASH BELTED SKIMMER DRAGONFLY	G1G3Q	S1S3	C2*	
MEGACEPHALA AFFINIS ANGUSTATA	A TIGER BEETLE	G5T3	S7		
MINISTRYMON CLYTIE	CLYTIE HAIRSTREAK	G3	S7		
NEUROCORDULIA MOLESTA	SMOKY SHADOWFLY	G3	S7		
OXYETHIRA FLORIDA	FLORIDA OXYETHIRAN MICRO CADDISFLY	G1	S7	C2	
PROTOPITIA ARCA	SAN MARCOS SADDLE-CASE CADDISFLY	G1G3	S1S3	C2	
PROTOPITIA BALMORHEA	BALMORHEA SADDLE-CASE CADDISFLY	G7	S7	C2	
RHADINE PERSEPHONE	TOOTH CAVE GROUND BEETLE	G1	S1	LE	
SCHINIA INDIANA	PHLOX MOTH	GU	SH	C2	
SOMATOCHLORA MARGARITA	BIG THICKET EMERALD DRAGONFLY	G2	S1S2	C2	

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STALLINGSLA MACULOSUS	MACULATED MANFREDA SKIPPER BUTTERFLY	G1G2	S1S2	C2	
TAENIOPTERYX STARKI	LEON RIVER WINTER STONEFLY	G1	S1	C2	
TEXAMAURORUS REDDELLI	KRETSCHMARR CAVE MOLD BEETLE	G1	S1	LE	
ZIZULA CYNA	CYNA BLUE	G3	S7		
*** MAMMALS					
BALAEONOPTERA MUSCULUS	BLUE WHALE	G2	S1	LE	E
BALAEONOPTERA PHYSALUS	FINBACK WHALE	G2	S1	LE	E
BLARINA HYLOPHAGA PLUMBEA	ARANSAS SHORT-TAILED SHREW	G5T3	S3	C2	
CANIS LUPUS	GRAY WOLF	G4	SX	LE	E
CANIS LUPUS BAILEYI	MEXICAN WOLF	G4T1	SX	LE	E
CANIS RUPIUS	RED WOLF	GXC	SX	LE	E
CHORONYCTERIS MEXICANA	LONG-TONGUED BAT	G2	S1	C2	
CONEPATUS LEUCONOTUS TEXENSIS	GULF COAST HOG-NOSED SKUNK	G5T7	S7	C1	
CONEPATUS MESOLEUCUS TELMALESTES	BIG THICKET HOG-NOSED SKUNK	G5T2	S1	C2	
CYNOMYS LUDOVICIANUS ARIZONENSIS	ARIZONA BLACK-TAILED PRAIRIE DOG	G5T3	S3	C2	
DIPHYLLA ECAUDATA	HAIRY-LEGGED VAMPIRE	G5	SA		
DIPLODOMYS ELATOR	TEXAS KANGAROO RAT	G2	S2	C2	T
EUBALAENA GLACIALIS	BLACK RIGHT WHALE	G2	S1	LE	E
EUDERMA MACULATUM	SPOTTED BAT	G4	S2	C2	T
EUMOPS PEROTIS CALIFORNICUS	CALIFORNIA MASTIFF BAT	G5T7	S3	C2	
FELIS PARDALIS	OCELOT	G2T	SX	LE	E
FELIS WIEDI	MARGAY	G2T	SX	LE	E
FELIS YAGOUAROUNDI	JAGUARUNDI	G4	S1	LE	E
FELIS YAGOUAROUNDI CACOMITLI	JAGUARUNDI	G4T1	S1	LE	
FERESA ATTENUATA	PYGMY KILLER WHALE	G4	S1		T
GEOMYS PERSONATUS FUSCUS	TEXAS POCKET GOPHER	G4T2	S2		
GEOMYS PERSONATUS MARITIMUS	MARITIME POCKET GOPHER	G4T2	S2	C2	
GEOMYS PERSONATUS STRECKERI	CARRIZO SPRINGS POCKET GOPHER	G4T1	S1	C2	
GLOBICEPHALA MACRORHYNCHUS	SHORT-FINNED PILOT WHALE	G5	S1		T
KOGIA BREVICEPS	PYGMY SPERM WHALE	G5	S1		T
KOGIA SIMUS	DWARF SPERM WHALE	G4	S1		T
LASIURUS EGA	SOUTHERN YELLOW BAT	G5	S1		
LEPTONYCTERIS NIVALIS	MEXICAN LONG-NOSED BAT	G3	S2	LE	E
MESOPLODON DENSIROSTRIS	TROPICAL BEAKED WHALE	G7	S1		
MESOPLODON EUROPAEUS	GERVAIS' BEAKED WHALE	G3	S1		T
MUSTELA NIGRIPES	BLACK-FOOTED FERRET	G1	SH	LE	E
MYOTIS AUSTRORIPARIUS	SOUTHEASTERN MYOTIS	G4	S3	C2	
MYOTIS LUCIFUGUS OCCULTUS	OCCULT OR ARIZONA LITTLE BROWN MYOTIS	G5T7	S3	C2	
NASUA NASUA	COATI	G5	S2?		E
ORCINUS ORCA	KILLER WHALE	G4G5	S1		T
ORYZOMYS COUESI AQUATICUS	COUES' RICE RAT	G5T7	S2	C2	T
OVIS CANADENSIS MEXICANA	DESERT BIGHORN SHEEP	G4T3	S2		
PANTHERA ONCA	JAGUAR	G3	SH		E
PEROMYSCUS TRUEI COMANCHE	PAID DURO MOUSE	G5T3Q	S2	C2	T
PHYSETER CATODON (=MACROCEPHALUS)	SPERM WHALE	G2	S1	LE	E
PLECOTUS RAFINESQUII	EASTERN BIG-EARED BAT	G3	S3	C2	T
PSEUDORCA CRASSIDENS	FALSE KILLER WHALE	G4	S1		T
SCALOPUS AQUATICUS TEXANUS	PRESIDIO MOLE	G5T10	S1	C2	
SIGMODON OCHROGNATHUS	YELLOW-NOSED COTTON RAT	G5	S3	C2	
SPILOGALE PUTORIUS INTERRUPTA	PLAINS SPOTTED SKUNK	G4T7	S7	C2	
STENELLA CLYMENE	SHORT-SNUOUT SPINNER DOLPHIN	G4	S1		
STENELLA LONGIROSTRIS	LONG-SNUOUT SPINNER DOLPHIN	G4	S1		T
STENELLA PLAGIODON	ATLANTIC SPOTTED DOLPHIN	G5	S1		T
STENO BREDAHENSIS	ROUGH-TOOTHED DOLPHIN	G7	S1		
SYLVILAGUS FLORIDANUS ROBUSTUS	DAVIS MOUNTAINS COTTONTAIL	G5T0	S3	C2	
THOMOMYS BOTTAE GUADALUPENSIS	QUADALUPE SOUTHERN POCKET GOPHER	G5T2	S2	C2	
THOMOMYS BOTTAE LIMPIAE	LIMPIA SOUTHERN POCKET GOPHER	G5T2	S2	C2	
THOMOMYS BOTTAE TEXENSIS	LIMPIA CREEK POCKET GOPHER	G5T2	S2	C2	
TRICHECHUS MANATUS	MANATEE	G2?	S1	LE	E
TURSIOPS TRUNCATUS	BOTTLE-NOSED DOLPHIN	G?	S2		
URSUS AMERICANUS	BLACK BEAR	G5	S3	T/SA	E
URSUS AMERICANUS LUTEOLUS	LOUISIANA BLACK BEAR	G5T3?	SR	LT	E
URSUS ARCTOS	GRIZZLY BEAR	G4	SR	LT	

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VULPES VELOX	SWIFT FOX	G4	S3	C2	
ZIPHIUS CAVIROSTRIS	GOOSE-BEAKED WHALE	G7	S1		T
*** MOLLUSKS					
AMBLEMA PLICATA PERPLICATA	ROUND LAKE	G5T30	S7		
ARCIDEUS CONFRAGOSUS	ROCK-POCKETBOOK	G3	S7		
ASHMUNELLA PASONIS	FRANKLIN MOUNTAIN WOOD SNAIL	G1	S1	C2	
ASSIMINEA PECOS	PECOS ASSIMINEA SNAIL	G2	S1	C1	
COCHLIOPA TEXANA	PHANTOM CAVE SNAIL	G1	S1	C2	
CYRTONAIAS TAMPIOCOENSIS	TAMPICO PEARLYMUSSEL	G1	S7		
DISCONAIAS SALINASSENSIS	SALINA MUCKET	G1	S1	C2	
EUCHEMOTREMA CHEATUMI	PALMETTO PILL SNAIL	G1	S1	C2	
FONTELICELLA DAVISI	DAVIS SPRING SNAIL	G1	S1	C2	
FONTELICELLA METCALFI	METCALF SPRING SNAIL	G1	S1	C2	
FONTELICELLA ROSWELLENSIS	ROSWELL SPRING SNAIL	G7	S7	C1	
FUSCONAIA ASKEVI	TEXAS PIGTOE	G3	S7		
FUSCONAIA EBENA	EBONY SHELL	G3	S7		
FUSCONAIA LANANENSIS	TRIANGLE PIGTOE	G2	S7		
GLEBULA ROTUNDATA	ROUND PEARLSHELL	G3	S7		
HUMBOLDTIANA CHEATUMI	DAVIS MOUNTAINS THREEBAND	G2	S2		
HUMBOLDTIANA CHISOSENSIS	CHISO MOUNTAINS THREEBAND	G1	S1		
HUMBOLDTIANA FERRISSIANA	MITRE PEAK THREEBAND	G2	S2		
HUMBOLDTIANA HOEGIANA PRAESIDI	SAN CARLOS THREEBAND	G3T3	S3		
HUMBOLDTIANA PALMERI	MOUNT LIVERMORE THREEBAND	G2	S2		
HUMBOLDTIANA TEXANA	STOCKTON PLATEAU THREEBAND	G2	S2		
HUMBOLDTIANA ULTIMA	NORTHERN THREEBAND	G2	S2		
LAMPSILIS BRACTEATA	TEXAS FATMUCKET	G2	S7		
LAMPSILIS HYDIAEA	LOUISIANA FATMUCKET	G2	S7		
LAMPSILIS STRAMINEA CLAIBORNENSIS	SOUTHERN FATMUCKET	G2T2	S7		
OBOVARIA JACKSONIANA	SOUTHERN HICKORYNUT	G1G2	S7		
PHREATODROBIA INITATA	MIMIC CAVESNAIL	G7	S1	C2	
PLEUROBEMA RIDDELLI	LOUISIANA PIGTOE	G2	S7		
POLYGYRA HIPPOCREPIS	HORSESHOE LIPTOOTH	G2	S2	C2	
POPENAIAS POPEI	TEXAS HORNSHELL	G2	S2	C2	
POTAMILUS AMPHICHAENUS	TEXAS HEELSPITTER	G1	S1	C2	
QUADRULA AUREA	GOLDEN ORB	G2G3	S7		
QUADRULA COUCHIANA	RIO GRANDE MONKEYFACE	G1Q	S7		
QUADRULA HOUSTONENSIS	SMOOTH PIMPLEBACK	G2	S7		
QUADRULA NODIFERA		G1G2Q	S7		
QUADRULA NODULATA	WARTYBACK	G3	S7		
QUADRULA PETRINA	TEXAS PIMPLEBACK	G2G3	S7		
QUADRULA PUSTULOSA NORTONI	WESTERN PIMPLEBACK	G5T2T3	S7		
QUINCUNCINA MITCHELLI	FALSE SPIKE MUSSEL	G2	S2	C2	
SONORELLA METCALFI	FRANKLIN MOUNTAIN TALUS SNAIL	G1	S1	C2	
STROPHITUS SUBVEXUS	SOUTHERN CREEKMUSSEL	G1	S7		
TOXOLASMA TEXASENSIS	TEXAS LILLIPUT	G3Q	S7		
TRUNCILLA COBATA	MEXICAN FANNSFOOT MUSSEL	G1	S7	C2	
TRUNCILLA MACRODON	TEXAS FANNSFOOT	G1G2	S7		
TRYONIA ADAMANTINA	DIAMOND Y SPRING SNAIL	G1	S1	C1	
TRYONIA BRUNEI	BRUNE SPRING SNAIL	G1	S1	C2	
TRYONIA CHEATUMI	PHANTOM LAKE TRYONIA	G1	S1	C2	
TRYONIA STOCKTONENSIS	GONZALES SPRING SNAIL	G1	S1	C1	
VILLOSA LIENOSA	LITTLE SPECTACLECASE	G3	S7		

*** REPTILES

CARETTA CARETTA	LOGGERHEAD SEA TURTLE	G3	S2	LT	E
CEMOPHORA COCCINEA COPEI	NORTHERN SCARLET SNAKE	G5T5	S3		T
CEMOPHORA COCCINEA LINERI	TEXAS SCARLET SNAKE	G5T2	S2		T
CHELONIA MYDAS	GREEN TURTLE	G3	S1	LT	T
COLEONYX RETICULATUS	RETICULATE GECKO	G3	S3	3C	T
CONIOPHANES IMPERIALIS	BLACK-STRIPED SNAKE	G3?	S2		T
CROTALUS HORRIDUS	TIMBER RATTLESNAKE	G5	S5		T
CROTAPHYTUS RETICULATUS	RETICULATE COLLARED LIZARD	G3	S2	C2	T

TEXAS PARKS AND WILDLIFE DEPARTMENT
TEXAS NATURAL HERITAGE PROGRAM
SPECIAL ANIMAL LIST
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SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK	STATE RANK	FEDERAL STATUS	STATE STATUS
DERMOCHELYS CORIACEA	LEATHERBACK SEA TURTLE	G3	S1	LE	E
DRYMARCHON CORAIS	INDIGO SNAKE	G5	S3		T
DRYNOBIUS MARGARITIFERUS	SPECKLED RACER	G5	S1		E
ERETMOCHELYS IMBRICATA	HAWKSBILL SEA TURTLE	G3	S1	LE	
ERETMOCHELYS IMBRICATA IMBRICATA	ATLANTIC HAWKSBILL SEA TURTLE	G3T3	S1	LE	E
GOPHERUS BERLANDIERI	TEXAS TORTOISE	G4	S3		T
GRAPTEMYS CAGLEI	CAGLE'S MAP TURTLE	G3	S3	C1	
GRAPTEMYS OUACHITENSIS SABINENSIS	SABINE MAP TURTLE	G5T3	S3	3C	
HOLBROOKIA LACERATA	SPOT-TAILED EARLESS LIZARD	G3?	S3?		
HOLBROOKIA PROPINQUA	KEELED EARLESS LIZARD	G3?	S3?		
KINOSTERNON HIRTIPES MURRAYI	CHIHUAHUA MUD TURTLE	G3T3	S1	C2	E
LEPIDOCHELYS KEMPII	KEMP'S RIDLEY SEA TURTLE	G1	S1	LE	E
LEPTODEIRA SEPTENTRIONALIS SEPTENTRIONALIS	NORTHERN CAT-EYED SNAKE	G5T5	S2		E
MACROCHELYS TEMMINCKII	ALLIGATOR SNAPPING TURTLE	G3G4	S3	C2	T
MALACLEMYS TERRAPIN LITTORALIS	TEXAS DIAMONDBACK TERRAPIN	G5T3	S3	C2	
NERODIA CLARKII	GULF SALT MARSH SNAKE	G4Q	S4	C2	
NERODIA HARTERI	HARTER'S WATER SNAKE	G2	S2		
NERODIA HARTERI HARTERI	BRAZOS WATER SNAKE	G2T2	S2	C2	T
NERODIA HARTERI PAUCIMACULATA	CONCHO WATER SNAKE	G2T2	S2	LT	E
OPHEODRYS VERNALIS	SMOOTH GREEN SNAKE	G5	S1		E
PHRYNOSOMA CORNUTUM	TEXAS HORNED LIZARD	G5	S4	C2	T
PHRYNOSOMA DOUGLASSI HERNANDEZI	MOUNTAIN SHORT-HORNED LIZARD	G5T5	S3		T
PITUOPHIS MELANOLEUCUS RUTHVENI	LOUISIANA PINE SNAKE	G5T3	S2	C2	E
TANTILLA ATRICEPS	MEXICAN BLACKHEAD SNAKE	G3	S1		
TANTILLA RUBRA	BIG BEND BLACKHEAD SNAKE	G4	S2		T
THAMNOPHIS SIRTALIS ANNECTENS	TEXAS GARTER SNAKE	G5T3	S3	C2	
THAMNOPHIS SIRTALIS DORSALIS	NEW MEXICO GARTER SNAKE	G5T3	S1		
TRACHEMYS GAIGEA	BIG BEND SLIDER	G3	S2		
TRIMORPHODON BISCUTATUS VILKINSONI	TEXAS LYRE SNAKE	G5T4	S3	3C	T

329 Records Processed

FEDERAL STATUS (USES A)

- LE - Listed Endangered
- LT - Listed Threatened
- LELT - Listed Endangered in part of range, Threatened in a different part
- PE - Proposed to be listed Endangered
- PT - Proposed to be listed Threatened
- E(S/A) or T(S/A) - Listed Endangered or Threatened on basis of Similarity of Appearance.
- C1 - Candidate, Category 1. USFWS has substantial information on biological vulnerability and threats to support proposing to list as endangered or threatened. Data are being gathered on habitat needs and/or critical habitat designations.
- C1* - C1, but lacking known occurrences
- C1** - C1, but lacking known occurrences, except in captivity/cultivation
- C2 - Candidate, Category 2. Information indicates that proposing to list as endangered or threatened is possibly appropriate, but substantial data on biological vulnerability and threats are not currently known to support the immediate preparation of rules. Further biological research and field study will be necessary to ascertain the status and/or taxonomic validity of the taxa in Category 2.
- C2* - C2, but lacking known occurrences
- C2** - C2, but lacking known occurrences, except in captivity/cultivation
- 3 - Taxa no longer being considered for listing as threatened or endangered. Three subcategories indicate the reasons for removal from consideration.
- 3A - Former Candidate, rejected because presumed extinct and/or habitats destroyed
- 3B - Former Candidate, rejected because not a recognized taxon; i.e. synonym or hybrid
- 3C - Former Candidate, rejected because more common, widespread, or adequately protected
- XE - Essential Experimental Population.
- XN - Non-essential Experimental Population.

STATE STATUS

- E - Listed as Endangered in the State of Texas
- T - Listed as Threatened in the State of Texas
- blank - Not currently listed

GLOBAL RANK (GRANK)

- G1 - Critically imperiled globally, extremely rare, 5 or fewer occurrences. [Critically endangered throughout range.]
- G2 - Imperiled globally, very rare, 6 to 20 occurrences. [Endangered throughout range.]
- G3 - Very rare and local throughout range or found locally in restricted range, 21 to 100 occurrences. [Threatened throughout range.]
- G4 - Apparently secure globally.
- G5 - Demonstrably secure globally.
- GH - Of historical occurrence through its range.
- G#NA - Accidental in North America.
- G#NE - An exotic species established in North America.
- G#T# - "G"= species rank; "T"= rank of variety or subspecies taxa.
- GU - Possibly in peril range-wide, but status uncertain.
- G#G# - Ranked within a range as status uncertain.
- GX - Believed to be extinct throughout range.
- Q - Qualifier denoting questionable taxonomic assignment.
- ? - Not ranked to date; or, Qualifier denoting uncertain rank.
- C - Captive population exists.

STATE RANK (SRANK)

- S1 - Critically imperiled in state, extremely rare, very vulnerable to extirpation, 5 or fewer occurrences.
- S2 - Imperiled in state, very rare, vulnerable to extirpation, 6 to 20 occurrences.
- S3 - Rare or uncommon in state, 21 to 100 occurrences.
- S4 - Apparently secure in state.
- S5 - Demonstrably secure in state.
- SA - Accidental in state.
- SE - An exotic species established in state.
- SH - Of historical occurrence in state. May be rediscovered.
- SN - Regularly occurring, usually migratory and typically non-breeding status.
- SR - Reported, but without persuasive documentation.
- SRF - Reported in error, but error persists in literature.
- SU - Possibly in peril in state, but status uncertain.
- SX - Apparently extirpated from State.
- ? - Not ranked to date; or, Qualifier denoting uncertain rank.
- C - Captive population exists.

TEXAS PARKS AND WILDLIFE DEPARTMENT
Texas Natural Heritage Program
Special Plant List
October 1993

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Abronia macrocarpa</u> large-fruited sand verbena	G1	S1	LE	E	NYCTAGINACEAE Four-o'clock Family	Freestone, Leon, and Robertson Counties
<u>Acleisanthes crassifolia</u> Texas trumpets	G2	S2	C2		NYCTAGINACEAE Four-o'clock Family	Kinney, Maverick, and Val Verde Counties; Coahuila, México
<u>Acleisanthes wrightii</u> Wright's trumpets	G2	S2			NYCTAGINACEAE Four-o'clock Family	Pecos, Reeves (H), Terrell, and Val Verde Counties
<u>Adelia vaseyi</u> Vasey's adelia	G2	S2			EUPHORBIACEAE Spurge Family	Cameron and Hidalgo Counties; Tamaulipas, México
<u>Aqalinis auriculata</u> auriculate false foxglove	G2	SX	C2		SCROPHULARIACEAE Snapdragon Family	Tarrant County (X); AL, AR, IA, IL, IN (H), KS, MD (H), MI, MN (H), MO, MS, NJ (H), OH, OK, PA, SC, TN, VA (H), WI (H), and WV
<u>Aqalinis navasotensis</u> Navasota false foxglove	G1	S1			SCROPHULARIACEAE Snapdragon Family	Grimes County
<u>Agave chisosensis</u> (see <u>Agave glomeruliflora</u>)						
<u>Agave glomeruliflora</u> Chisos agave	G2Q	S2	C2		AGAVACEAE Agave Family	Brewster, Culberson, and Hudspeth Counties; Coahuila, México
<u>Agrimonia incisa</u> incised groovebur	G3	S1	C2		ROSACEAE Rose Family	Jasper County; AL, FL, GA, MS, and SC
<u>Allium elmendorfii</u> Elmendorf's onion	G2	S2			LILIACEAE Lily Family	Atascosa, Bee, Bexar, Kenedy, Llano, Nueces, Refugio, San Patricio, and Wilson Counties
<u>Ambrosia cheiranthifolia</u> South Texas ambrosia	G2	S2	PE		ASTERACEAE Sunflower Family	Cameron (H), Jim Wells, Kleberg, and Nueces Counties; Tamaulipas, México
<u>Amsonia tharpii</u> Tharp's blue-star	G1	S1	C2		APOCYNACEAE Dogbane Family	Pecos County; NM
<u>Ancistrocactus tobuschii</u> Tobusch fishhook cactus	G2	S2	LE	E	CACTACEAE Cactus Family	Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Andrachne arida</u> Trans-Pecos maidenbush	G2	S1	C2		EUPHORBIACEAE Spurge Family	Brewster and Presidio Counties; Chihuahua and Coahuila, México
<u>Anemone edwardsiana</u> var. <u>petraea</u> Edge Falls anemone	G3T1	S1	C2		RANUNCULACEAE Buttercup Family	Bandera and Kendall Counties
<u>Anthericum chandleri</u> (see <u>Echeandia chandleri</u>)						
<u>Anulocaulis leiosolenus</u> var. <u>lasianthus</u> Chihuahua ringstem	G4T2	S2			NYCTAGINACEAE Four-o'clock Family	Brewster, Culberson (H), and Presidio Counties; Chihuahua, México
<u>Aquilegia chrysantha</u> var. <u>chaplinei</u> Guadalupe Mountains columbine	G4T2	S2	3C		RANUNCULACEAE Buttercup Family	Culberson and Presidio (?) Counties; NM
<u>Aquilegia chrysantha</u> var. <u>hinckleyana</u> Hinckley's columbine	G4T1	S1	C2		RANUNCULACEAE Buttercup Family	Presidio County
<u>Aquilegia longissima</u> long spur columbine	G3	S2	C2		RANUNCULACEAE Buttercup Family	Brewster, Jeff Davis, and Presidio Counties; Chihuahua, Coahuila, and Nuevo León, México
<u>Arenaria livermorensis</u> Livermore sandwort	G1	S1	C2		CARYOPHYLLACEAE Pink Family	Jeff Davis County
<u>Argythamnia aphoroides</u> Hill Country wild-mercury	G2	S2	C2		EUPHORBIACEAE Spurge Family	Blanco, Gillespie, Hays (H), Kendall (H), Kerr, Menard, Mills (H), Tom Green, and Uvalde Counties
<u>Argythamnia argyraea</u> silvery wild-mercury	G2	S2	3C		EUPHORBIACEAE Spurge Family	Kinney, La Salle, and Maverick (H) Counties
<u>Armoracia aquatica</u> (see <u>Armoracia lacustris</u>)						
<u>Armoracia lacustris</u> lake cress	G4?	S1	C2		BRASSICACEAE Mustard Family	Tyler County; IL, IN, KY, MI, MO, NC, OK, SC, TN, WI, and Canada
<u>Asclepias prostrata</u> prostrate milkweed	G1	S1	C2		ASCLEPIADACEAE Milkweed Family	Starr and Zapata Counties; Tamaulipas, México

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Aster laevis</u> var. <u>guadalupensis</u> Guadalupe Mountains aster	G5 T2Q	S1	C2		ASTERACEAE Sunflower Family	Culberson County; NM
<u>Aster puniceus</u> ssp. <u>elliottii</u> var. <u>scaberrimus</u> rough-stem aster	G5T1	S1	C1		ASTERACEAE Sunflower Family	Anderson, Cherokee, Smith, Van Zandt, and Wood Counties
<u>Astragalus gypsodes</u> gyp locoweed	G2	S2	3C		FABACEAE Legume Family	Culberson, Hudspeth, and Reeves Counties; NM
<u>Astragalus mollissimus</u> var. <u>marcidus</u> withered woolly loco	G5T2	S2	C2		FABACEAE Legume Family	Dallam, Jeff Davis (H), and Presidio Counties
<u>Astrophytum asterias</u> star cactus	G1	S1	PE		CACTACEAE Cactus Family	Cameron, Hidalgo (H), and Starr Counties; Nuevo León and Tamaulipas, México
<u>Atriplex klebergorum</u> Kleberg saltbush	G2	S2	3C		CHENOPODIACEAE Goosefoot Family	Kleberg, La Salle, Starr, and Webb Counties
<u>Ayenia limitaris</u> Texas ayenia	G2	S1	PE		STERCULIACEAE Cacao Family	Cameron and Hidalgo Counties; Coahuila, México
<u>Bartonia texana</u> Texas screwstem	G2	S2	3C		GENTIANACEAE Gentian Family	Hardin, Jasper, Nacogdoches, Newton, Polk, San Augustine, San Jacinto, and Tyler Counties
<u>Batesimalva violacea</u> purple gay-mallow	G2	S1	C2		MALVACEAE Mallow Family	Brewster County; Coahuila and Nuevo León, México
<u>Boerhavia mathisiana</u> Mathis spiderling	G2	S1	C2		NYCTAGINACEAE Four-o'clock Family	Live Oak and San Patricio Counties; San Luis Potosí and Tamaulipas, México
<u>Bonamia ovalifolia</u> bigpod bonamia	G1	S1	C2		CONVOLVULACEAE Morning-glory Family	Brewster County; adjacent México
<u>Bouteloua kavi</u> Kay's grama	G1	S1			POACEAE Grass Family	Brewster County
<u>Brickellia baccharidea</u> resin-leaf brickellbush	G2	S1			ASTERACEAE Sunflower Family	El Paso County; AZ; Sonora, México
<u>Brickellia brachyphylla</u> var. <u>hinckleyi</u> Hinckley's brickellbush	G5T2	S2	C2		ASTERACEAE Sunflower Family	Brewster (H) and Jeff Davis Counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Brickellia brachyphylla</u> var. <u>terlinguensis</u> Terlingua brickellbush	G5TH	SH	C2		ASTERACEAE Sunflower Family	Brewster (H) and Hudspeth (H) Counties
<u>Brickellia viejensis</u> Sierra Vieja brickellbush	G1G2	S1S2	C2		ASTERACEAE Sunflower Family	Presidio County
<u>Brongniartia minutifolia</u> little-leaf brongniartia	G2	S1	C2		FABACEAE Legume Family	Brewster County; Chihuahua, México
<u>Caesalpinia brachycarpa</u> broadpod rushpea	G2	S2	C2		FABACEAE Legume Family	Crockett (H), Edwards (H), Kinney, Llano (H), and Sutton Counties
<u>Caesalpinia phyllanthoides</u> South Texas rushpea	G2	S1			FABACEAE Legume Family	Bexar, Jim Wells, and Live Oak Counties; Tamaulipas, México
<u>Callirhoe scabriuscula</u> Texas poppy-mallow	G2	S2	LE	E	MALVACEAE Mallow Family	Coke, Mitchell, and Runnels Counties
<u>Campanula reverchonii</u> Basin bellflower	G2	S2	3C		CAMPANULACEAE Bluebell Family	Burnet, Llano, and Travis (H) Counties
<u>Cardamine macrocarpa</u> var. <u>texana</u> Texas largeseed bittercress	G2T2	S2			BRASSICACEAE Mustard Family	Brewster, Kinney, and Uvalde Counties; Coahuila and Nuevo León, México
<u>Cardiospermum dissectum</u> Chihuahua balloon-vine	G2	S2			SAPINDACEAE Soapberry Family	Hidalgo (H), Starr, and Zapata Counties; Chihuahua, México
<u>Carex hyalina</u> tissue sedge	G2Q	S1	C2		CYPERACEAE Sedge Family	Cass, Dallas (H), Houston, Liberty, and Walker Counties; AR and OK
<u>Cassia orcuttii</u> (see <u>Senna orcuttii</u>)						
<u>Cassia riplevana</u> (see <u>Senna riplevana</u>)						
<u>Castilleja ciliata</u> fringed paintbrush	G1Q	S1	C2		SCROPHULARIACEAE Snapdragon Family	Jeff Davis County
<u>Castilleja elongata</u> tall paintbrush	G2Q	S2	C1		SCROPHULARIACEAE Snapdragon Family	Brewster County

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Cereus greggii</u> var. <u>greggii</u> desert night-blooming cereus	G4T2	S2	C2		CACTACEAE Cactus Family	Brewster, El Paso, Hudspeth (H), Jeff Davis, Pecos (H), Presidio, and Terrell (H) Counties; AZ and NM; Chihuahua, Coahuila, Durango, and Zacatecas, México
<u>Chaetopappa hershevi</u> mat leastdaisy	G2	S2	C2		ASTERACEAE Sunflower Family	Culberson and Hudspeth Counties; NM
<u>Chamaesyce astyla</u> alkali spurge	G2	S1			EUPHORBIACEAE Spurge Family	Pecos County; Coahuila, Durango, and Nuevo León, México
<u>Chamaesyce chaetocalyx</u> var. <u>triligulata</u> three-tongue spurge	G5T1	S1	C2		EUPHORBIACEAE Spurge Family	Brewster and Randall (?) Counties; Coahuila, México
<u>Chamaesyce geyeri</u> var. <u>wheeleriana</u> Wheeler's spurge	G5T2	S1			EUPHORBIACEAE Spurge Family	El Paso and Hudspeth Counties; NM; Chihuahua, México
<u>Chamaesyce golondrina</u> swallow spurge	G2	S2	C2		EUPHORBIACEAE Spurge Family	Brewster, Hudspeth, and Presidio Counties; Chihuahua and Coahuila, México
<u>Chamaesyce perennans</u> perennial spurge	G2	S2	3C		EUPHORBIACEAE Spurge Family	Brewster and Presidio Counties; Chihuahua, México
<u>Chloris texensis</u> Texas windmill-grass	G2	S2	C2		POACEAE Grass Family	Brazoria, Brazos (H), Chambers, Galveston, Harris, Hidalgo (?), Nueces, and Refugio Counties
<u>Chrysothamnus nauseosus</u> ssp. <u>texensis</u> Guadalupe Mountains rabbitbrush	G5T2	S1	C2		ASTERACEAE Sunflower Family	Culberson County; NM
<u>Citharexylum spathulatum</u> Mission fiddlewood	G2	S2			VERBENACEAE Vervain Family	Hidalgo, Starr, and Zapata Counties
<u>Cleome multicaulis</u> manystem spiderflower	G3	S1	C2		CAPPARIDACEAE Caper Family	Presidio County; AZ, CO, NM, and WY; Chihuahua, Durango, Jalisco, México, and Michoacán, México
<u>Golubrina stricta</u> Comal snakewood	G2	S1	C2		RHAMNACEAE Buckthorn Family	Comal (?), El Paso, and Uvalde (?) Counties; Coahuila and Nuevo León, México

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Condalia hookeri</u> var. <u>edwardsiana</u> Edwards Plateau capul negro	G5 T1Q	S1	C2		RHAMNACEAE Buckthorn Family	Edwards County
<u>Coreopsis intermedia</u> golden wave tickseed	G3	S3	C2		ASTERACEAE Sunflower Family	Anderson, Cass, Cherokee, Franklin, Freestone, Harris, Harrison, Henderson, Houston, Leon, Nacogdoches (?), Trinity, Upshur, and Wood (H) Counties; LA
<u>Coryphantha albicolumnaria</u> white column cactus	G2	S2	C2		CACTACEAE Cactus Family	Brewster, Pecos, and Presidio Counties; Chihuahua, México
<u>Coryphantha chaffeyi</u> Chaffey's cory cactus	G2	S1	C2		CACTACEAE Cactus Family	Brewster County; Coahuila, San Luis Potosí, and Zacatecas, México
<u>Coryphantha dasycantha</u> var. <u>dasycantha</u> dense cory cactus	G3T2	S2	C2		CACTACEAE Cactus Family	Brewster, El Paso (H), Hudspeth, Jeff Davis, and Pecos Counties
<u>Coryphantha duncanii</u> Duncan's cory cactus	G3	S1	C2		CACTACEAE Cactus Family	Brewster and Presidio Counties; NM
<u>Coryphantha hesteri</u> Hester's cory cactus	G2	S2	C2		CACTACEAE Cactus Family	Brewster, Pecos, and Terrell Counties
<u>Coryphantha macromeris</u> var. <u>runyonii</u> Runyon's cory cactus	G3T2	S2			CACTACEAE Cactus Family	Cameron (H), Hidalgo, and Starr Counties
<u>Coryphantha minima</u> Nellie cory cactus	G1	S1	LE	E	CACTACEAE Cactus Family	Brewster County
<u>Coryphantha ramillosa</u> bunched cory cactus	G2	S2	LT	T	CACTACEAE Cactus Family	Brewster and Terrell Counties; Coahuila, México
<u>Coryphantha sneedii</u> var. <u>sneedii</u> Sneed pincushion cactus	G2T2	S2	LE	E	CACTACEAE Cactus Family	El Paso County; NM
<u>Coryphantha strobiliformis</u> var. <u>durispina</u> (see <u>Coryphantha albicolumnaria</u>)						
<u>Coryphantha sulcata</u> var. <u>nickelsiae</u> Nickel's cory cactus	G4T2	SH	C2		CACTACEAE Cactus Family	Webb County (H); Coahuila, Nuevo León, and Tamaulipas, México

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Crataegus warneri</u> Warner's hawthorn	G2Q	S2	C2		ROSACEAE Rose Family	Anderson, Cherokee, Freestone, Houston, Morris, Panola, Smith (H), and Walker Counties
<u>Croton alabamensis</u> var. <u>texensis</u> Texabama croton	G2T1	S1	C2		EUPHORBIACEAE Spurge Family	Bell, Coryell, and Travis Counties
<u>Croton pottsi</u> var. <u>thermophilus</u> leatherweed croton	G5T2	S1			EUPHORBIACEAE Spurge Family	Brewster County; Coahuila, México
<u>Croton suaveolens</u> scented croton	G2	S2			EUPHORBIACEAE Spurge Family	Brewster, Culberson, and Jeff Davis Counties; Chihuahua, Coahuila, and Nuevo León, México
<u>Cryptantha crassipes</u> Terlingua Creek cat's-eye	G1	S1	LE	E	BORAGINACEAE Borage Family	Brewster County
<u>Cryptantha paysonii</u> Payson's hiddenflower	G3	S1			BORAGINACEAE Borage Family	Culberson and El Paso Counties; NM
<u>Cuscuta attenuata</u> marshelder dodder	G2?	S2	C2		CONVOLVULACEAE Morning-glory Family	Cameron (H), Jackson (H), Liberty (H), Rains, and Van Zandt Counties; KS and OK
<u>Cyperus cephalanthus</u> giant sharpstem umbrella- sedge	G2Q	SH	C2		CYPERACEAE Sedge Family	Texas (H; county unknown); LA
<u>Cyperus grayioides</u> Mohlenbrock's umbrella- sedge	G3G4	S3	C2		CYPERACEAE Sedge Family	Anderson, Angelina, Burleson, Colorado, Franklin, Freestone, Hardin, Henderson, Houston, Leon, Nacogdoches, Newton, Parker (?), Robertson, Rusk, San Augustine, Shelby, Smith, Tyler, Upshur, Van Zandt, and Wood Counties; IL, LA, and MO
<u>Cyperus onerosus</u> dune umbrella-sedge	G2	S2	C2		CYPERACEAE Sedge Family	Andrews, Ward, and Winkler Counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Cypripedium kentuckiense</u> southern lady's-slipper	G3	S1	C2		ORCHIDACEAE Orchid Family	Cass (?), Harrison, Nacogdoches, Newton (X), Sabine, and San Augustine Counties; AL, AR, KY, LA, MS, OK, and TN
<u>Dalea bartonii</u> Cox's dalea	G1	S1	C2		FABACEAE Legume Family	Brewster County
<u>Dalea reverchonii</u> Comanche Peak prairie-clover	G2	S2	C2		FABACEAE Legume Family	Hood (X), Parker, and Wise Counties
<u>Dalea sabinalis</u> Sabinal prairie-clover	G1	S1	C2		FABACEAE Legume Family	Bandera (H), Uvalde (H), and Val Verde Counties
<u>Desmodium lindheimeri</u> Lindheimer's tickseed	G1	SH	C2		FABACEAE Legume Family	Comal (?) County; Nuevo León, San Luis Potosí, and Tamaulipas, México
<u>Draba standleyi</u> Standley's draba	G3	S1	C2		BRASSICACEAE Mustard Family	Jeff Davis County; AZ and NM
<u>Dyssodia tephroleuca</u> (see <u>Thymophylla tephroleuca</u>)						
<u>Echeandia chandleri</u> lila de los llanos	G3	S3	C2		LILIACEAE Lily Family	Cameron, Kleberg, and Nueces Counties
<u>Echinocactus asterias</u> (see <u>Astrophytum asterias</u>)						
<u>Echinocereus berlandieri</u> var. <u>angusticeps</u> (see <u>Echinocereus papillosus</u> var. <u>angusticeps</u>)						
<u>Echinocereus chisoensis</u> var. <u>chisoensis</u> Chisos hedgehog cactus	G2T1	S1	LT	T	CACTACEAE Cactus Family	Brewster County
<u>Echinocereus chloranthus</u> var. <u>neocapillus</u> golden-spine hedgehog cactus	G3T1	S1	C2		CACTACEAE Cactus Family	Brewster and Presidio Counties
<u>Echinocereus lloydii</u> Lloyd's hedgehog cactus	G2Q	S2	LE	E	CACTACEAE Cactus Family	Brewster, Culberson, Pecos, and Presidio Counties; NM; Chihuahua, México
<u>Echinocereus papillosus</u> var. <u>angusticeps</u> small papillosus cactus	G3T1	S1	C2		CACTACEAE Cactus Family	Hidalgo (H) and Jim Hogg (?) Counties

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<u>Echinocereus reichenbachii</u> var. <u>albertii</u> black lace cactus	G4T1	S1	LE	E	CACTACEAE Cactus Family	Duval (I), Jim Wells, Kleberg, and Refugio Counties
<u>Echinocereus reichenbachii</u> var. <u>chisoensis</u> (see <u>Echinocereus chisoensis</u> var. <u>chisoensis</u>)						
<u>Echinocereus viridiflorus</u> var. <u>correllii</u> Correll's green pitaya	G4T2	S2	3C		CACTACEAE Cactus Family	Brewster, Coke, and Pecos Counties
<u>Echinocereus viridiflorus</u> var. <u>davisii</u> Davis' green pitaya	G4T1	S1	LE	E	CACTACEAE Cactus Family	Brewster County
<u>Eleocharis brachycarpa</u> short-fruited spikesedge	G1	SH	C2		CYPERACEAE Sedge Family	south coastal Texas (H; county unknown); Tamaulipas, México
<u>Eleocharis cylindrica</u> cylinder spikesedge	G1	S1	C2		CYPERACEAE Sedge Family	Lubbock (H) and Presidio Counties
<u>Eleocharis wolfii</u> Wolf's spikesedge	G4G5	S?	C2		CYPERACEAE Sedge Family	Texas (county unknown); AL, CO, IA, IL, IN, KS, LA, MN, MO, ND, NE, OH, OK, TN, and WI; Alberta and Saskatchewan, Canada
<u>Erigeron mimeqletes</u> Sonora fleabane	G2	S2	C2		ASTERACEAE Sunflower Family	Brewster (H), Crockett (H), Edwards (H), Kerr, Real, Schleicher, Sutton, Uvalde, and Val Verde (H) Counties; Coahuila, México
<u>Eriocaulon koernickianum</u> dwarf pipewort	G2G3	S1	C2		ERIOCAULACEAE Pipewort Family	Brazos, Freestone, Leon (?), and Tyler (H) Counties; AR, GA, and OK
<u>Eriogonum greggii</u> Gregg's wild-buckwheat	G2	S1			POLYGONACEAE Knotweed Family	Hidalgo (H) and Starr Counties; Coahuila and Nuevo León, México
<u>Eriogonum nealleyi</u> Irion County wild-buckwheat	G2	S2	3C		POLYGONACEAE Knotweed Family	Coke, Howard, Irion, Pecos (H), Reagan, Rannels, and Sterling Counties
<u>Eriogonum suffruticosum</u> bushy wild-buckwheat	G2	S2	C2		POLYGONACEAE Knotweed Family	Brewster, Pecos, and Presidio Counties
<u>Escobaria badenii</u> Guadalupe Mountains pincushion cactus	G1	S1	C2		CACTACEAE Cactus Family	Culberson County

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<u>Esenbeckia runyonii</u> jopoy	G2G3	S1			RUTACEAE Citrus Family	Cameron County; Hidalgo, Nuevo León, San Luis Potosí, and Tamaulipas, México
<u>Euphorbia astyla</u> (see <u>Chamaesyce astyla</u>)						
<u>Euphorbia chaetocalyx</u> var. <u>triliquilata</u> (see <u>Chamaesyce chaetocalyx</u> var. <u>triliquilata</u>)						
<u>Euphorbia geyeri</u> var. <u>wheeleriana</u> (see <u>Chamaesyce geyeri</u> var. <u>wheeleriana</u>)						
<u>Euphorbia golondrina</u> (see <u>Chamaesyce golondrina</u>)						
<u>Euphorbia perennans</u> (see <u>Chamaesyce perennans</u>)						
<u>Eysenhardtia spinosa</u> spiny kidney-wood	G2	S2			FABACEAE Legume Family	Presidio County; Chihuahua and Durango, México
<u>Festuca ligulata</u> Guadalupe Mountains fescue	G1	S1	C1		POACEAE Grass Family	Brewster and Culberson Counties; Coahuila, México
<u>Forsellesia texensis</u> Texas grease bush	G1	S1	C2		CROSSOSOMATACEAE Grease Bush Family	Uvalde and Val Verde (H) Counties
<u>Frankenia johnstonii</u> Johnston's frankenia	G2	S2	LE	E	FRANKENIACEAE Frankenia Family	Starr and Zapata Counties; Nuevo León, México
<u>Fryxellia pygmaea</u> small Fryxell-wort	G1	SH	C2		MALVACEAE Mallow Family	west Texas (H; county unknown); Coahuila, México
<u>Gaillardia aestivalis</u> var. <u>winkleri</u> white firewheel	G5T1	S1	C2		ASTERACEAE Sunflower Family	Hardin County
<u>Galium correllii</u> cliff bedstraw	G2	S1	C2		RUBIACEAE Madder Family	Brewster and Val Verde Counties; Coahuila, México
<u>Gaura boquillensis</u> Boquillas lizardtail	G2	S2			ONAGRACEAE Evening Primrose Family	Brewster and Presidio Counties; Chihuahua, Coahuila, and Nuevo León, México
<u>Genistidium dumosum</u> brush-pea	G1	S1	C2		FABACEAE Legume Family	Brewster County; Coahuila, México
<u>Grindelia oolepis</u> plains gumweed	G2	S2	3C		ASTERACEAE Sunflower Family	Bee, Cameron, Nueces, Refugio, and San Patricio Counties
<u>Gutierrezia triflora</u> (see <u>Thurovia triflora</u>)						

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<u>Hedeoma apiculatum</u> McKittrick pennyroyal	G3	S2	LT	T	LAMIACEAE Mint Family	Culberson County; NM
<u>Hedeoma pilosum</u> Old Blue pennyroyal	GH	SH	C2		LAMIACEAE Mint Family	Brewster County (H)
<u>Hedyotis butterwickiae</u> Mary's bluet	G1	S1	C2		RUBIACEAE Madder Family	Brewster County
<u>Hedyotis correllii</u> Correll's bluet	G1	S1			RUBIACEAE Madder Family	Zapata County
<u>Hedyotis mullerae</u> Katherine's bluet	G2	S1			RUBIACEAE Madder Family	Brewster County; Coahuila, México
<u>Helianthus neglectus</u> neglected sunflower	G2Q	S2			ASTERACEAE Sunflower Family	Ector, Loving, Ward, and Winkler Counties
<u>Helianthus paradoxus</u> puzzle sunflower	G2	S1	C1		ASTERACEAE Sunflower Family	Pecos and Reeves Counties; NM
<u>Helianthus praecox</u> ssp. <u>hirtus</u> Dimmit sunflower	G4 T1Q	S1	C2		ASTERACEAE Sunflower Family	Dimmit and Zapata Counties
<u>Hexalectris nitida</u> Glass Mountains coral-root	G2	S2	C2		ORCHIDACEAE Orchid Family	Bandera, Brewster, Coryell, Dallas, Hays, Kendall, Pecos (H), Taylor, and Travis Counties; Coahuila, México
<u>Hexalectris revoluta</u> Chisos coral-root	G1	S1	C2		ORCHIDACEAE Orchid Family	Brewster and Culberson Counties; Nuevo León and San Luis Potosí, México
<u>Hexalectris warnockii</u> Warnock's coral-root	G2	S2	C2		ORCHIDACEAE Orchid Family	Brewster, Dallas, Gillespie, Jeff Davis (H), Taylor, and Terrell Counties; AZ and NM
<u>Hibiscus dasycalyx</u> Neches River rose-mallow	G1	S1	C2		MALVACEAE Mallow Family	Cherokee, Harrison, Houston, and Trinity Counties
<u>Hoffmannseggia tenella</u> slender rush-pea	G1	S1	LE	E	FABACEAE Legume Family	Kleberg and Nueces Counties
<u>Houstonia butterwickiae</u> (see <u>Hedyotis butterwickiae</u>)						
<u>Hymenopappus biennis</u> biennial woollywhite	G2	S2			ASTERACEAE Sunflower Family	Culberson County; NM

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<u>Hymenopappus carrizoanus</u> sandhill woollywhite	G2	S2			ASTERACEAE Sunflower Family	Anderson, Atascosa, Bexar (H), Caldwell (H), Frio, Guadalupe, Leon, Medina, and Robertson Counties
<u>Hymenoxys texana</u> prairie dawn	G2	S2	LE	E	ASTERACEAE Sunflower Family	Fort Bend, Harris, and La Salle (?) Counties
<u>Isoetes lithophila</u> rock quillwort	G2	S2	C2		ISOETACEAE Quillwort Family	Burnet, Llano, and Mason Counties
<u>Justicia runyonii</u> Runyon's water-willow	G2	S2	C2		ACANTHACEAE Acanthus Family	Brazoria, Cameron, Goliad (?), and Hidalgo Counties; Tamaulipas, México
<u>Justicia wrightii</u> Wright's water-willow	G2	S2	C2		ACANTHACEAE Acanthus Family	Brewster (H), Pecos, and Val Verde Counties
<u>Kallstroemia perennans</u> perennial caltrop	G1	S1	C2		ZYGOPHYLLACEAE Caltrop Family	Brewster, Presidio, and Val Verde Counties
<u>Lachnocaulon digynum</u> tiny bog buttons	G3	S1	C2		ERIOCAULACEAE Pipewort Family	Jasper and Newton Counties; AL, FL, LA, and MS
<u>Leavenworthia texana</u> Texas golden glade cress	G1	S1	C2		BRASSICACEAE Mustard Family	Nacogdoches (I), Sabine, and San Augustine Counties
<u>Lechea mensalis</u> Chisos pinweed	G1Q	S1	C2		CISTACEAE Rockrose Family	Brewster County; Coahuila, México
<u>Lepidospartum burgessii</u> gypsum scalebroom	G2	S1	C2		ASTERACEAE Sunflower Family	Hudspeth County; NM
<u>Lesquerella pallida</u> white bladderpod	G1	S1	LE	E	BRASSICACEAE Mustard Family	San Augustine County
<u>Lesquerella thamnophila</u> Zapata bladderpod	G1	S1	C1		BRASSICACEAE Mustard Family	Starr and Zapata Counties
<u>Lesquerella valida</u> strong bladderpod	G2	S1	3C		BRASSICACEAE Mustard Family	Culberson and Hudspeth Counties; NM
<u>Liatris bracteata</u> coastal gay-feather	G2	S2			ASTERACEAE Sunflower Family	Aransas, Galveston, Live Oak (H), Matagorda, Refugio, and San Patricio Counties
<u>Liatris cymosa</u> branched gay-feather	G2	S2	3C		ASTERACEAE Sunflower Family	Brazos, Burleson, Walker, and Washington Counties

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<u><i>Liatris tenuis</i></u> slender gay-feather	G2G3	S2S3	C2		ASTERACEAE Sunflower Family	Angelina, Jasper, Newton, Sabine, San Augustine, and Tyler Counties; LA (?)
<u><i>Lycium texanum</i></u> Texas wolf-berry	G2	S2	C2		SOLANACEAE Potato Family	Brewster, Culberson, and Hudspeth Counties
<u><i>Machaeranthera aurea</i></u> Houston machaeranthera	G2	S2	C2		ASTERACEAE Sunflower Family	Galveston and Harris Counties
<u><i>Machaeranthera heterocarpa</i></u> (see <u><i>Psilactis heterocarpa</i></u>)						
<u><i>Manfreda longiflora</i></u> Runyon's huaco	G2	S2	C2		AGAVACEAE Agave Family	Cameron (H), Hidalgo, and Starr Counties
<u><i>Manihot walkerae</i></u> Walker's manioc	G1	S1	LE	E	EUPHORBIACEAE Spurge Family	Hidalgo and Starr (H) Counties; Tamaulipas, México
<u><i>Matelea radiata</i></u> Falfurrias milkvine	G1	S1	C2		ASCLEPIADACEAE Milkweed Family	Brooks (H), Hidalgo (H), and Starr (?) Counties
<u><i>Matelea texensis</i></u> Texas milkvine	G1	S1	C2		ASCLEPIADACEAE Milkweed Family	Brewster County
<u><i>Mimulus dentilobus</i></u> fringed monkeyflower	G2	S1			SCROPHULARIACEAE Snapdragon Family	Presidio County; AZ and NM; Chihuahua, México
<u><i>Mirabilis collina</i></u> sandhill four-o'clock	G2	S2	C2		NYCTAGINACEAE Four-o'clock Family	Anderson, Austin (?), Cherokee (H), Lamar (?), Morris (?), Red River (?), San Augustine (?), Smith, Waller (?), and Wood Counties
<u><i>Muhlenbergia villosa</i></u> villous muhly	G2Q	S2	3B		POACEAE Grass Family	Glasscock, Howard, Hudspeth, and Presidio Counties; NM
<u><i>Neolloydia mariposensis</i></u> Lloyd's mariposa cactus	G2	S2	LT	T	CACTACEAE Cactus Family	Brewster County; Coahuila, México
<u><i>Nolina arenicola</i></u> sand sacahuista	G2Q	S2	C2		AGAVACEAE Agave Family	Culberson, El Paso (?), and Hudspeth Counties
<u><i>Oenothera pilosella</i></u> ssp. <u><i>sessilis</i></u> Grand Prairie evening primrose	G5T2	SH	C2		ONAGRACEAE Evening Primrose Family	Galveston County (H); AR and LA

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<u>Opuntia arenaria</u> sand prickly-pear	G2	S2	C2		CACTACEAE Cactus Family	El Paso and Hudspeth (H) Counties; NM; Chihuahua, México
<u>Opuntia aureispina</u> golden-spine prickly-pear	G1	S1	C2		CACTACEAE Cactus Family	Brewster County
<u>Opuntia engelmannii</u> var. <u>flexospina</u> few-spine Engelmann's prickly-pear	G3T1	S1	C2		CACTACEAE Cactus Family	Starr, Webb (H), and Zapata Counties
<u>Opuntia imbricata</u> var. <u>argentea</u> silver cholla	G5T1	S1	C2		CACTACEAE Cactus Family	Brewster County
<u>Opuntia macrocentra</u> var. <u>aureispina</u> (see <u>Opuntia aureispina</u>)						
<u>Osmorhiza mexicana</u> ssp. <u>bipatriata</u> Livermore sweet-cicely	G4T1	S1	C2		APIACEAE Carrot Family	Jeff Davis County; Coahuila and Nuevo León; México
<u>Ostrya chisosensis</u> Big Bend hop-hornbeam	G2	S1	C2		BETULACEAE Birch Family	Brewster County; northern México
<u>Oxypolis ternata</u> threeleaf cowbane	G3?	S1	C2		APIACEAE Carrot Family	Hardin and Tyler (?) Counties; FL, GA, MS, NC, and SC
<u>Paronychia congesta</u> bushy whitlow-wort	G1	S1	C1		CARYOPHYLLACEAE Pink Family	Jim Hogg County
<u>Paronychia lundellorum</u> Lundell's whitlow-wort	G1	S1			CARYOPHYLLACEAE Pink Family	Brooks, Kenedy, and Kleberg Counties
<u>Paronychia maccartii</u> McCart's whitlow-wort	G1	S1	C2		CARYOPHYLLACEAE Pink Family	Webb County
<u>Paronychia wilkinsonii</u> Wilkinson's whitlow-wort	G2	S2	C2		CARYOPHYLLACEAE Pink Family	Brewster County; Chihuahua and Coahuila, México
<u>Pediocactus papyracanthus</u> paper-spine cactus	G3	S1	C2		CACTACEAE Cactus Family	Hudspeth County; AZ and NM
<u>Pediomelum humile</u> Rydberg's scurfpea	G2	S1	C2		FABACEAE Legume Family	Val Verde County; Coahuila, México
<u>Pediomelum pentaphyllum</u> three-nerve scurfpea	G1G2	SH	C2		FABACEAE Legume Family	Presidio County (H); NM (H); Chihuahua, México
<u>Pediomelum trinervatum</u> (see <u>Pediomelum pentaphyllum</u>)						

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<u>Penstemon alamosensis</u> Alamo beardtongue	G2	S1	C2		SCROPHULARIACEAE Snapdragon Family	El Paso County; NM
<u>Penstemon cardinalis</u> ssp. <u>regalis</u> royal red penstemon	G3T2	S2			SCROPHULARIACEAE Snapdragon Family	Culberson and Jeff Davis Counties; NM
<u>Perityle bisetosa</u> var. <u>appressa</u> appressed two-bristle rock- daisy	G2T2	S2			ASTERACEAE Sunflower Family	Brewster County; Coahuila, México
<u>Perityle bisetosa</u> var. <u>bisetosa</u> two-bristle rock-daisy	G2T1	S1	C2		ASTERACEAE Sunflower Family	Brewster and Pecos Counties
<u>Perityle bisetosa</u> var. <u>scalaris</u> stairstep two-bristle rock- daisy	G2T1	S1	C2		ASTERACEAE Sunflower Family	Brewster County
<u>Perityle cinerea</u> gray rock-daisy	G2	S2	3C		ASTERACEAE Sunflower Family	Pecos, Reeves (H), Terrell, and Upton Counties
<u>Perityle dissecta</u> slimlobe rock-daisy	G2	S2			ASTERACEAE Sunflower Family	Brewster and Presidio Counties; Chihuahua, México
<u>Perityle huecoensis</u> Hueco rock-daisy	G1	S1	C2		ASTERACEAE Sunflower Family	El Paso County
<u>Perityle vitreomontana</u> Glass Mountains rock-daisy	G1	S1	C2		ASTERACEAE Sunflower Family	Brewster County
<u>Perityle warnockii</u> Warnock's rock-daisy	G1	S1	C2		ASTERACEAE Sunflower Family	Val Verde County
<u>Phacelia pallida</u> pale phacelia	G2	S1	C2		HYDROPHYLLACEAE Waterleaf Family	Brewster County; Chihuahua and Coahuila, México
<u>Philadelphus crinitus</u> bearded mock-orange	G2	S1			SAXIFRAGACEAE Saxifrage Family	Jeff Davis County; AZ
<u>Philadelphus ernestii</u> canyon mock-orange	G2	S2	C2		SAXIFRAGACEAE Saxifrage Family	Blanco, Comal, Hays, Kendall, and Travis Counties
<u>Philadelphus texensis</u> Texas mock-orange	G2	S2	3C		SAXIFRAGACEAE Saxifrage Family	Bandera, Comal (H), Edwards (H), Kendall (H), Medina (H), Real, and Uvalde Counties; Coahuila, México

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<u>Phlox nivalis</u> ssp. <u>texensis</u> Texas trailing phlox	G4T2	S2	LE	E	POLEMONIACEAE Phlox Family	Hardin, Polk, and Tyler Counties
<u>Phyllanthus ericoides</u> heather leaf-flower	G2	S1	C2		EUPHORBIACEAE Spurge Family	Brewster and Terrell Counties; Coahuila, México
<u>Physostegia correllii</u> Correll's false dragon-head	G2	S2	C2		LAMIACEAE Mint Family	Bexar (H), Galveston, Montgomery (H), Travis, Val Verde, and Zapata Counties; LA; Coahuila, Durango, Nuevo León, and Sonora, México
<u>Physostegia longisepala</u> long-sepaled false dragon-head	G2G3	S2	C2		LAMIACEAE Mint Family	Hardin, Jasper, Newton, and Orange Counties; LA
<u>Poa involuta</u> (see <u>Poa strictiramea</u>)						
<u>Poa strictiramea</u> desert mountains bluegrass	G3	S1	C2		POACEAE Grass Family	Brewster County; Chihuahua, Coahuila, Durango, Nuevo León, and Zacatecas, México
<u>Polemonium pauciflorum</u> ssp. <u>hinckleyi</u> Hinckley's Jacob's-ladder	G3 T1Q	S1	C2		POLEMONIACEAE Phlox Family	Jeff Davis County; AZ; Chihuahua, México
<u>Polianthes runyonii</u> (see <u>Manfreda longiflora</u>)						
<u>Polygala maravillasensis</u> Maravillas milkwort	G2	S1	C2		POLYGALACEAE Milkwort Family	Brewster and Terrell Counties; Coahuila, México
<u>Polygala rimulicola</u> var. <u>rimulicola</u> rock crevice milkwort	G2T2	S2	3C		POLYGALACEAE Milkwort Family	Culberson and Hudspeth Counties; NM
<u>Polygonella parksii</u> Parks' jointweed	G2	S2	3C		POLYGONACEAE Knotweed Family	Atascosa, Bexar, Burleson, Guadalupe, Leon, Robertson, and Wilson Counties
<u>Potamogeton clystocarpus</u> Little Aguja pondweed	G1	S1	LE	E	POTAMOGETONACEAE Pondweed Family	Jeff Davis County
<u>Prenanthes barbata</u> rattlesnake root	G2G3	S2	C2		ASTERACEAE Sunflower Family	Hardin, Jasper, Nacogdoches, and Shelby Counties; AL, AR, GA, LA, and TN

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<u>Proboscidea sabulosa</u> dune unicorn-plant	G2	S2	3C		MARTYNIACEAE Unicorn-plant Family	Andrews, Crane, Loving, Ward, and Winkler Counties; NM; Chihuahua, México
<u>Proboscidea spicata</u> many-flowered unicorn-plant	G1	S1	C2		MARTYNIACEAE Unicorn-plant Family	Brewster, Jeff Davis, and Presidio Counties; Coahuila, México
<u>Prunus murrayana</u> Murray's plum	G2	S2	3C		ROSACEAE Rose Family	Brewster, Culberson (H), and Jeff Davis Counties
<u>Pseudoclapia arenaria</u> sand false clappia-bush	G2G3	S2			ASTERACEAE Sunflower Family	Bailey, Culberson, Gaines (H), Hall (H), Hudspeth, Lubbock, Pecos, and Reeves Counties; NM and OK; Coahuila, México
<u>Pseudoclapia watsonii</u> Watson's false clappia-bush	G1	S1			ASTERACEAE Sunflower Family	Hudspeth and Jeff Davis Counties
<u>Psilactis heterocarpa</u> Welder machaeranthera	G2	S2	C2		ASTERACEAE Sunflower Family	Nueces, Refugio, San Patricio, and Victoria Counties
<u>Psoralea rydbergii</u> (see <u>Pediomelum humile</u>)						
<u>Psoralea trinervata</u> (see <u>Pediomelum pentaphyllum</u>)						
<u>Quercus boyntonii</u> Boynton's oak	GHQ	SH	C2		FAGACEAE Beech Family	Angelina County (H); AL (H)
<u>Quercus depressipes</u> Mexican dwarf oak	G2	S1			FAGACEAE Beech Family	Jeff Davis County; Chihuahua and Durango, México
<u>Quercus graciliformis</u> Chisos oak	G1	S1	C2		FAGACEAE Beech Family	Brewster County
<u>Quercus hinckleyi</u> Hinckley's oak	G2	S2	LT	T	FAGACEAE Beech Family	Brewster and Presidio Counties; Chihuahua (?), México
<u>Quercus robusta</u> robust oak	G1Q	S1			FAGACEAE Beech Family	Brewster County
<u>Quercus tardifolia</u> lateleaf oak	G1	S1	C2		FAGACEAE Beech Family	Brewster County
<u>Rorippa ramosa</u> canyon watercress	G2	S1			BRASSICACEAE Mustard Family	Brewster and Terrell Counties; Chihuahua, Coahuila, and Durango, México

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Rosa stellata</u> ssp. <u>mirifica</u> var. <u>erlansoniae</u> Erlanson's desert rose	G3?	S1			ROSACEAE Rose Family	Culberson County
<u>Rudbeckia scabrifolia</u> bog coneflower	G2	S2	C2		ASTERACEAE Sunflower Family	Angelina, Jasper, Newton, Sabine, and Shelby Counties; LA
<u>Salvia penstemonoides</u> big red sage	G1G2	S1S2	C2		LAMIACEAE Mint Family	Bandera, Bexar (H), Gillespie (H), Guadalupe (H), Kendall, Kerr, Real, Travis (I), and Wilson (H) Counties
<u>Salvia summa</u> mountain sage	G2	S2			LAMIACEAE Mint Family	Culberson, El Paso, and Hudspeth Counties; NM
<u>Schwalbea americana</u> chaffseed	G2	S?	LE		SCROPHULARIACEAE Snapdragon Family	Texas (county unknown); AL, CT, DE, FL, GA, KY, MA, MD, MS, NC, NJ, NY, SC, TN, and VA
<u>Scirpus hallii</u> Hall's bulrush	G2?	S?	C2		CYPERACEAE Sedge Family	Texas (county unknown); AL, GA, IA, IL, IN, KY, MA, MI, MO, NE, SC, and WI
<u>Scutellaria laevis</u> smooth-stem skullcap	G1	S1	C2		LAMIACEAE Mint Family	Culberson and Hudspeth Counties
<u>Scutellaria thieretii</u> Thieret's skullcap	G2Q	S1	C2		LAMIACEAE Mint Family	Nueces County; LA
<u>Sedum havardii</u> Havard's stonecrop	G2	S2			CRASSULACEAE Orpine Family	Brewster and Jeff Davis (H) Counties; Coahuila, México
<u>Sedum robertsonianum</u> Roberts' stonecrop	G1Q	S1	C2		CRASSULACEAE Orpine Family	Brewster County
<u>Selaginella viridissima</u> green spikemoss	G2	S1			SELAGINELLACEAE Spikemoss Family	Brewster and Jeff Davis Counties; Coahuila, México
<u>Senna orcuttii</u> Orcutt's senna	G2	S2			FABACEAE Legume Family	Brewster and Terrell (H) Counties; NM; Coahuila, Durango, and Sonora, México
<u>Senna ripleyana</u> Ripley's senna	G2	SH	C2		FABACEAE Legume Family	Brewster County (H); Chihuahua and Zacatecas, México
<u>Sesuvium trianthemoides</u> roughseed sea-purslane	G1	S1	C2		AIZOACEAE Carpet-weed Family	Aransas (M), Kenedy, and Nueces (M) Counties

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Sibara grisea</u> gray sibara	G3?	S1	3C		BRASSICACEAE Mustard Family	Hudspeth County; NM
<u>Silene plankii</u> Plank's catchfly	G2	S1	3C		CARYOPHYLLACEAE Pink Family	El Paso County; NM
<u>Silene subciliata</u> scarlet catchfly	G3	S3	C2		CARYOPHYLLACEAE Pink Family	Hardin, Jasper, Jefferson (H), Liberty, Newton, Polk, Sabine, Shelby, and Tyler Counties; LA
<u>Solanum leptosepalum</u> Tigna potato	G2	S1			SOLANACEAE Potato Family	Jeff Davis (H) and Presidio Counties; Chihuahua and Coahuila, México
<u>Sophora gypsophila</u> var. <u>guadalupensis</u> gyp mountain-laurel	G1T1	S1	3C		FABACEAE Legume Family	Culberson County; NM; Chihuahua, México
<u>Spiranthes parksii</u> Navasota ladies'-tresses	G3	S3	LE	E	ORCHIDACEAE Orchid Family	Brazos, Burleson, Freestone, Grimes, Jasper, Leon, Madison, Robertson, and Washington Counties
<u>Streptanthus bracteatus</u> bracted twistflower	G2	S2	C2		BRASSICACEAE Mustard Family	Bandera, Caldwell (?), Comal, Medina, Real, Travis, and Uvalde Counties
<u>Streptanthus cutleri</u> Cutler's twistflower	G2	S2	C2		BRASSICACEAE Mustard Family	Brewster County; Coahuila, México
<u>Streptanthus sparsiflorus</u> sparsely-flowered jewelflower	G2	S2	C2		BRASSICACEAE Mustard Family	Culberson County; NM
<u>Styrax texana</u> Texas snowbells	G1	S1	LE	E	STYRACACEAE Storax Family	Edwards, Kinney (I), Real, and Val Verde Counties
<u>Styrax youngae</u> Young's snowbells	G1	SH	C2		STYRACACEAE Storax Family	Jeff Davis County (H); Coahuila and Nuevo León, México
<u>Suaeda duripes</u> hardtoe seepweed	GHQ	SH	C2		CHENOPODIACEAE Goosefoot Family	Pecos (H) and/or Reeves (H) Counties
<u>Symphoricarpos guadalupensis</u> McKittrick snowberry	G1	S1	C2		CAPRIFOLIACEAE Honeysuckle Family	Culberson County
<u>Talinum rugospermum</u> roughseed flameflower	G3G4	S1	C2		PORTULACACEAE Purslane Family	Nacogdoches County; IA, IL, IN, MN, NE, and WI

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Thalictrum arkansanum</u> Arkansas meadow-rue	G2Q	S1	C2		RANUNCULACEAE Buttercup Family	Bowie, Lamar, and Red River Counties; AR and OK
<u>Thalictrum texanum</u> Texas meadow-rue	G2Q	S2	C2		RANUNCULACEAE Buttercup Family	Brazos, Harris (H), and Waller Counties
<u>Thelocactus bicolor</u> var. <u>flavidispinus</u> straw-spine glory-of-Texas	G4T2	S2	C2		CACTACEAE Cactus Family	Brewster and Starr (?) Counties; Tamaulipas, México
<u>Thelypodium tenue</u> Fresno Creek thelypod	G1Q	S1	C2		BRASSICACEAE Mustard Family	Presidio County
<u>Thurovia triflora</u> threeflower broomweed	G2	S2			ASTERACEAE Sunflower Family	Aransas, Brazoria, Calhoun, Harris (H), Jackson (H), Refugio, San Patricio (H), and Waller (H) Counties
<u>Thymophylla tephroleuca</u> ashy dogweed	G1	S1	LE	E	ASTERACEAE Sunflower Family	Starr (H), Webb, and Zapata Counties
<u>Tillandsia baileyi</u> Bailey's ballmoss	G2	S2	C2		BROMELIACEAE Bromeliad Family	Brooks (H), Cameron, Hidalgo, Jim Wells, Kenedy, and Willacy Counties; Tamaulipas, México
<u>Toumea papyracantha</u> (see <u>Pediocactus papyracanthus</u>)						
<u>Trillium pusillum</u> var. <u>texanum</u> Texas trillium	G3T2 T3Q	S2S3	C2		LILIACEAE Lily Family	Cass, Harrison, Houston (H), Nacogdoches, Panola (H), Rusk, Smith, and Wood (?) Counties; AR and LA
<u>Trillium texanum</u> (see <u>Trillium pusillum</u> var. <u>texanum</u>)						
<u>Valeriana texana</u> Guadalupe Mountains valerian	G2	S2	3C		VALERIANACEAE Valerian Family	Culberson County; NM
<u>Valerianella texana</u> Edwards Plateau cornsalad	G2	S2	C2		VALERIANACEAE Valerian Family	Burnet, Gillespie, and Llano Counties
<u>Viola guadalupensis</u> Guadalupe Mountains violet	G1	S1	C2		VIOLACEAE Violet Family	Culberson County
<u>Xyris drummondii</u> Drummond's yellow-eyed grass	G3	S2	C2		XYRIDACEAE Yellow-eyed Grass Family	Angelina, Jasper, and Newton Counties; AL, FL, GA, LA, and MS

Scientific Name Common Name	Rank*		Status**		Family	Distribution***
	Global	State	Federal	State		
<u>Xyris scabrifolia</u> rough-leaf yellow-eyed grass	G2G3	S2	C2		XYRIDACEAE Yellow-eyed Grass Family	Angelina, Jasper, Newton, and Sabine Counties; AL, FL, GA, LA, and MS
<u>Yucca necopina</u> Glen Rose yucca	G1Q	S1			AGAVACEAE Agave Family	Somervell County
<u>Zanthoxylum parvum</u> Shinners' tickle-tongue	G1	S1	C1		RUTACEAE Citrus Family	Brewster and Jeff Davis Counties
<u>Zizania texana</u> Texas wild-rice	G1	S1	LE	E	POACEAE Grass Family	Hays County

Explanation of Terms and Symbols

*Rank- Two ranking categories are provided for each plant as follows:

Global Rank (denoted by G and a number, 1-5 or H)

- G1 = less than 6 occurrences known globally; critically imperiled, especially vulnerable to extinction
- G2 = 6-20 occurrences known globally; imperiled and very vulnerable to extinction throughout its range
- G3 = 21-100 occurrences known globally; either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g., a single state or physiographic region), or because of other factors making it vulnerable to extinction throughout its range
- G4 = more than 100 occurrences known, apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery
- G5 = demonstrably secure globally, though it may be quite rare in parts of its range
- GH = of historical occurrence throughout its range, i.e., formerly part of the established biota, with expectation that it may be rediscovered

State Rank (denoted by S and a number, 1-5 or H)

- S1 = less than 6 occurrences known in Texas; critically imperiled in Texas; especially vulnerable to extirpation from the state
- S2 = 6-20 known occurrences in Texas; imperiled in the state because of rarity; very vulnerable to extirpation from the state
- S3 = 21-100 known Texas occurrences; either rare or uncommon in the state
- S4 = more than 100 occurrences in Texas; apparently secure in the state, though it may be quite rare in some areas of the state
- S5 = demonstrably secure in Texas
- SH = historical in Texas, perhaps having not been verified in the past 50 years, but suspected to be extant
- SX = believed extirpated from the state

A global or state rank followed by "Q" indicates that the taxonomic status of the plant is a matter of conjecture. A rank followed by "?" indicates that the rank is not certain. A "T" subrank following a global rank denotes the rank for subspecific taxa. Two G or S ranks together (G2G3; S1S2; etc.) indicate that the plant is borderline between the ranks. All state and most global ranks are assigned by the Texas Natural Heritage Program.

**Status- Two status categories are provided for each plant as follows:

Federal Legal Status (according to the United States Fish & Wildlife Service)

- LE = listed as a federally endangered plant
- LT = listed as a federally threatened plant
- PE = proposed to become listed as endangered
- PT = proposed to become listed as threatened
- C1 = federal candidate category 1 plant with enough information available to propose for listing
- C2 = federal candidate category 2 plant under current review for possible listing as either endangered or threatened, but USFWS is in need of more information
- 3B = taxa that are no longer considered taxonomically valid
- 3C = no longer under federal review for listing; either more abundant or widespread than was previously thought

State Legal Status (according to the Texas Parks & Wildlife Department)

- E = listed as a state endangered plant
- T = listed as a state threatened plant

***Distribution

Abbreviations for states in the U.S. are those of the U.S. Postal Service. Alphabetical qualifiers following counties or states are defined as follows: H = historical (not observed or collected within 50 years); I = introduced; M = misidentification; X = presumed extirpated; and ? = questionable locality or identification.

This Special Plant List is produced by the Texas Natural Heritage Program. It is reviewed periodically and necessary revisions are incorporated. Should you have any comments or questions regarding this list, please contact the Texas Natural Heritage Program, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, Texas 78744; (512) 448-4311.

CHANGES IN THE 1993 SPECIAL PLANT LIST

The following taxa were added to the list.

Agalinis navasotensis (Navasota false foxglove) G1S1
Armoracia lacustris (lake cress) G4?S1, C2
Esenbeckia runyonii (jopoy) G2G3S1
Oxypolis ternata (threeleaf cowbane) G3?S1 C2

The following taxa were deleted from the list.

Brickellia shineri (Shiner's brickellbush) - more common than previously thought

The following taxa had additions, deletions, or corrections to their distribution.

Acleisanthes wrightii - change status of Reeves County to historical
Agalinis auriculata - add Alabama; delete questionable status from Oklahoma
Agave glomeruliflora - add Hudspeth County
Allium elmdorfii - add Bee, Nueces, and Refugio Counties
Anulocaulis leiosolenus var. lasianthus - change status of Culberson County to historic
Aster puniceus ssp. elliottii var. scabricaulis - add Cherokee County
Astrophytum asterias - add Cameron and Hidalgo (historic) Counties
Brickellia brachyphylla var. hinckleyi - change status of Brewster County to historic
Caesalpinia brachycarpa - add Llano County (historic); change status of Edwards County to historic
Campanula reverchonii - change status of Travis County to historic
Carex hyalina - add Liberty County
Castilleja elongata - delete Jeff Davis County
Cereus greggii var. greggii - change status of Pecos County to historic
Chloris texensis - add Nueces County
Colubrina stricta - add questionable status to Comal County
Coreopsis intermedia - add Harrison County; delete historic status from Leon and Trinity Counties;
 add questionable status to Nacogdoches County
Croton alabamensis var. texensis - add Bell County
Cuscuta attenuata - change status on Cameron, Jackson, and Liberty Counties to historic; change KN
 to KS (Kansas)
Cyperus gravioroides - add Houston and Parker (questionable) Counties
Cypripedium kentuckiense - delete Tyler County (no record found)
Desmodium lindheimeri - add questionable status to Comal County; add Tamaulipas, México
Echinocereus papillosus var. angusticeps - add historic status to Hidalgo County
Echinocereus reichenbachii var. albertii - add Duval County (introduced)
Erigeron nimegletes - add Kerr County and Coahuila, México; add historic status to Crockett and
 Edwards Counties
Eriogonum greggii - add historic status to Hidalgo County
Eriogonum suffruticosum - delete historic status from Presidio County
Grindelia ooplepis - delete Jim Wells County
Hedeoma pilosum - add historic status to Brewster County

Helianthus neglectus - add Ector and Winkler Counties
Hexalectris nitida - add Coryell, Hays, and Travis Counties; change status of Pecos County to historic
Hexalectris revoluta - add San Luis Potosí, México
Hexalectris warnockii - add historic status to Jeff Davis County
Hibiscus dasycalyx - add Cherokee and Houston Counties
Hymenopappus carrizoanus - add Frio County
Hymenoxys texana - change La Salle County historic status to questionable status
Justicia runyonii - delete questionable status from Brazoria County
Liatris bracteata - add historic status to Live Oak County
Liatris tenuis - delete questionable status from San Augustine County
Manihot walkerae - add historic status to Starr County
Matelea radiata - add historic status to Brooks and Hidalgo Counties
Mirabilis collina - add San Augustine and Waller County; delete Wall County; add questionable status to Austin, San Augustine, and Waller Counties
Perityle cinerea - add historic status to Reeves County
Philadelphus ernestii - add Comal County
Philadelphus texensis - add Coahuila, México
Phlox nivalis spp. texensis - delete historic status from Polk County
Physostegia correllii - add historic status to Montgomery County; add Durango, México
Polygonella parksii - add Burleson County
Proboscidea spicata - add Coahuila, México
Pseudocappia arenaria - add Lubbock County and Oklahoma (OK)
Psilactis heterocarpa - add Victoria County
Quercus depressipes - add Durango, México
Quercus hinckleyi - add Brewster County and Chihuahua (questionable), México
Rudbeckia scabrifolia - add Shelby County
Schwalbea americana - add Alabama (AL)
Senna orcuttii - add Durango and Sonora, México
Senna ripleana - add historic status to Brewster County
Sesuvium trianthemoides - add Aransas and Nueces Counties as misidentifications
Streptanthus bracteatus - add Bandera, Comal, and Real Counties
Thalictrum arkansanum - add Bowie County
Thalictrum texanum - delete Gonzales, Hardin, and Red River Counties as these specimens were misidentified
Thurovia triflora - add historic status to Jackson County
Thymophylla tephroleuca - add Webb County
Tillandsia bailei - add Tamaulipas, México
Trillium pusillum var. texanum - add Smith County; delete Tyler County; delete questionable status from Rusk County

The following taxa had changes in their status, either federal, state, and/or rank.

Ambrosia cheiranthifolia - from G1S1 to G2S2 and C1 to PE
Aquilegia chrysantha var. chaplinei - from G2S2 to G4T2S2
Aquilegia longissima - from G3S1 to G3S2
Aster laevis var. guadalupensis - from G5T2S1 to G5T2Q81 (Nesom 1993)
Aster puniceus ssp. elliottii var. scabricaulis - from G4T1S1 to G5T1S1

Astrophytum asterias - from C1 to PE
Avena limitaris - from C1 to PE
Boerhavia mathisiana - from 3C to C2
Castilleja ciliata - from G1S1 to G1QS1 (Nesom 1992)
Castilleja elongata - from G2S2 to G2QS2 (Nesom 1992)
Cereus greggii var. greggii - from G3T2S2 to G4T2S2
Chrysothamnus nauseosus var. texensis - from G5T1S1 to G5T2S1
Coryphantha albicolumnaria - from C1 to C2
Coryphantha sulcata var. nickelsiae - from G4THSH to G4T2SH
Croton alabamensis var. texensis - from G1T1S1 to G2T1S1
Cryptantha crassipes - now state listed as endangered
Cryptantha paysonii - from G2S1 to G3S1
Cuscuta attenuata - from G3S2 to G2?S2
Cyperus graviooides - from G3S3 to G3G4S3
Draba standleyi - from G2S1 to G3S1
Hedeoma apiculatum - from G2S2 to G3S2
Hedeoma pilosum - from G1S1 to GHSH
Helianthus paradoxus - from G1S1 to G2S1
Lachnocaulon digynum - from G2G3S1 to G3S1
Lycium texanum - from 3C to C2
Manihot walkerae - now state listed as endangered
Pediocactus papyracanthus - from G2S1 to G3S1
Pediomelum pentaphyllum - from G1SH to G1G2SH
Phlox nivalis ssp. texensis - now state listed as endangered
Potanogeton clystocarpus - now state listed as endangered
Pseudoclaippia arenaria - from G2S2 to G2G3S2
Psilactis heterocarpa - from G1S1 to G2S2
Rosa stellata ssp. mirifica var. erlansoniae - from G3T1S1 to G3?T1S1
Schwalbea americana - from C1 to LE; from G2G3S? to G2S?
Scirpus hallii - from G3S? to G2?S?
Senna riplejana - from G2S1 to G2SH
Sibara grisea - from G2S1 to G3?S1
Silene plankii - from G2G3S1 to G2S1
Trillium pusillum var. texanum - from G2G3QS2S3 to G3T2T3QS2S3

The following taxa had significant changes in either the scientific or common name.

Ambrosia cheiranthifolia - from South Texas ragweed to South Texas ambrosia
Anthericum chandleri - replaced by Echeandia chandleri (Johnston 1990)
Chrysothamnus nauseosus ssp. texensis - from Guadalupe rabbitbrush to Guadalupe Mountains rabbitbrush
Coryphantha albicolumnaria - from white column to white column cactus
Cyperus cephalanthus - from cryptic flat sedge to giant sharpstem umbrella-sedge
Cyperus oerosus - from dune flat-sedge to dune umbrella-sedge
Draba standleyi - from Standley's whitlow-wort to Standley's draba
Echeandia chandleri - replaces Anthericum chandleri (Johnston 1990)
Echinocereus papillosus var. angusticeps - from small papillosus to small papillosus cactus
Fleocharis brachycarpa - from short-fruited spikebrush to short-fruited spikesedge

Eleocharis cylindrica - from cylinder spikerush to cylinder spikesedge
Eriocaulon koernickianum - from small-headed pipewort to dwarf pipewort
Escobaria guadalupensis - from Guadalupe pincushion cactus to Guadalupe Mountains pincushion cactus
Festuca ligulata - from Guadalupe fescue to Guadalupe Mountains fescue
Isoetes lithophila - from Isoetes lithophylla
Machaeranthera heterocarpa - replaced by Psilactis heterocarpa (Morgan 1993)
Paronychia wilkinsonii - from Wilkinson's nail-wort to Wilkinson's whitlow-wort
Pediomelum pentaphyllum - replaces Pediomelum trinervatum (Grimes 1990)
Penstemon alamosensis - from Penstemon alamoensis
Perityle warnockii - from river rock-daisy to Warnock's rock-daisy
Psilactis heterocarpa - replaces Machaeranthera heterocarpa (Morgan 1993)
Quercus depressipes - from dwarf Mexican oak to Mexican dwarf oak
Quercus graciliformis - from slender oak to Chisos oak
Quercus tardifolia - from Chisos Mountains oak to lateleaf oak
Talinum rugospermum - from rough-seed fame flower to roughseed flameflower
Thelocactus bicolor var. flavidispinus - from straw spine cactus to straw-spine glory-of-Texas
Valeriana texana - from Guadalupe valerian to Guadalupe Mountains valerian

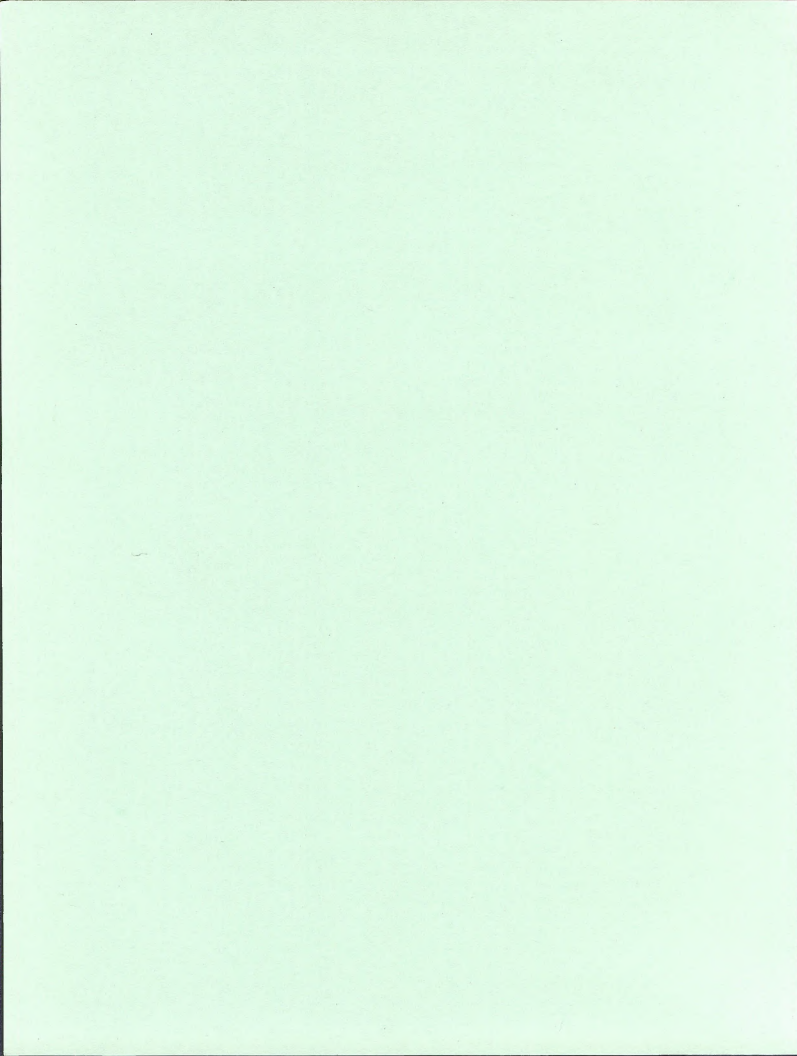
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ACRONYMS AND ABBREVIATIONS

REFERENCES/BIBLIOGRAPHY

INDEX



ACRONYMS AND ABBREVIATIONS

AAF	Auxiliary Air Field	NHP	National Historic Park
AFB	Air Force Base	NHS	National Historic Site
APD	Application for Permit to Drill	NP	National Park
ARS	Agricultural Research Service	NPS	National Park Service
BLM	Bureau of Land Management	NRA	National Recreation Area
BP	Bureau of Prisons	NS	National Seashore
BR	Bureau of Reclamation	NSO	No Surface Occupancy
CFR	Code of Federal Regulations	NSO/ND	No Surface Occupancy, No Directional Drilling
CMG	Continuing Management Guidance	NSO/DD	No Surface Occupancy Directional Drilling
COA	Condition(s) of Approval	NSO/ELEV	No Surface Occupancy, based on elevation or surface use if suitable non-agency lands are included in the same drilling unit
COE	Corps of Engineers		
CRMWA	Canadian River Municipal Water Authority	NTL	Notice to Lessees
DOD	Department of Defense	NWR	National Wildlife Refuge
DOE	Department of Energy	ODWC	Oklahoma Department of Wildlife Conservation
DOI	Department of the Interior	P.L.	Public Law
DOJ	Department of Justice	RFD	Reasonable Foreseeable Development
EA	Environmental Assessment	RMP	Resource Management Plan
EIS	Environmental Impact Statement	SCS	Soil Conservation Service
E.O.	Executive Order	SHPO	State Historic Preservation Office
ESA	Endangered Species Act of 1973	SMA	Surface Management Agency
FCI	Federal Correctional Institution	SSS	Special Status Species
FLPMA	Federal Land Policy and Management Act of 1976	STC	Standard Terms and Conditions
FMA	Fluid Minerals Assessment	T&E	Threatened and Endangered
FWS	U.S. Department of the Interior, Fish and Wildlife Service	TARL	Texas Archeological Research Lab
LN	Lease Notice	TPWD	Texas Parks and Wildlife Department
MSA	Management Situation Analysis	USAF	U.S. Air Force
MSL	Mean Sea Level	U.S.C.	United States Code
MWS	Maximum Water Surface	USDA	U.S. Department of Agriculture
NALF	Naval Auxiliary Landing Field	USFS	U.S. Forest Service
NAS	Naval Air Station	USGS	U.S. Geological Survey
NEPA	National Environmental Policy Act	USIBWC	International Boundary and Water Commission, United States and Mexico, United States Section
NFH	National Fish Hatchery		
NHPA	National Historic Preservation Act	USN	U.S. Navy
NIROP	Naval Industrial Reserve Ordnance Plant		
NMe	National Memorial		
Nmo	National Monument		

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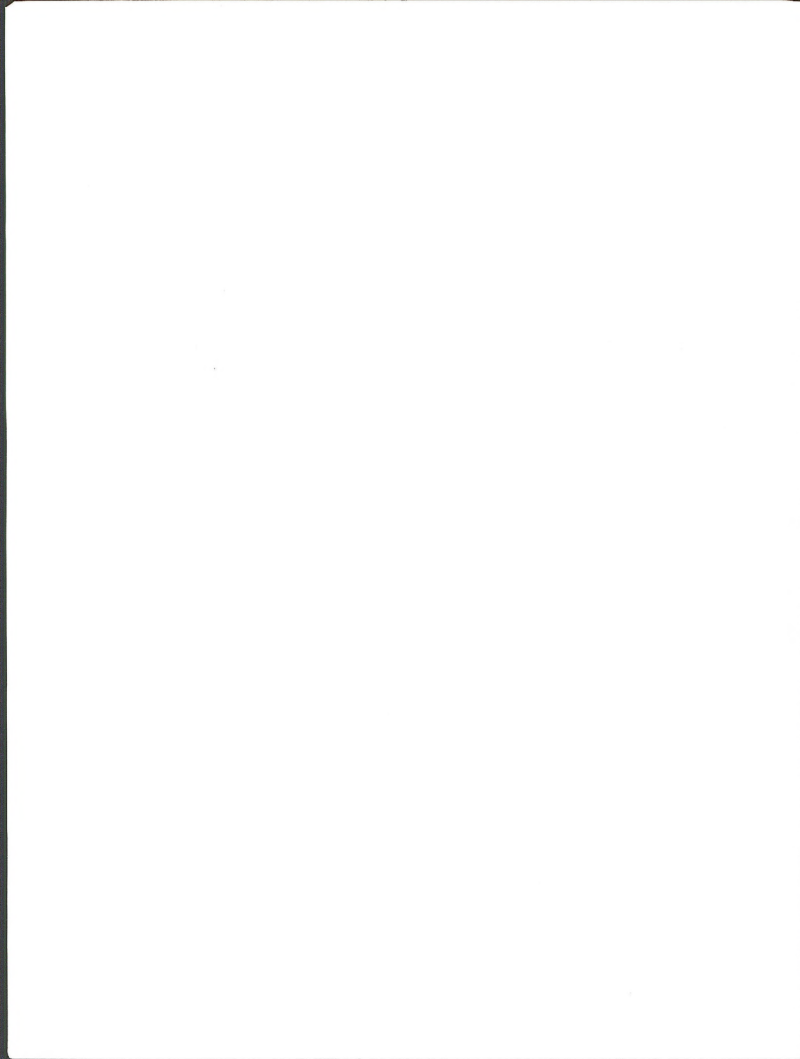
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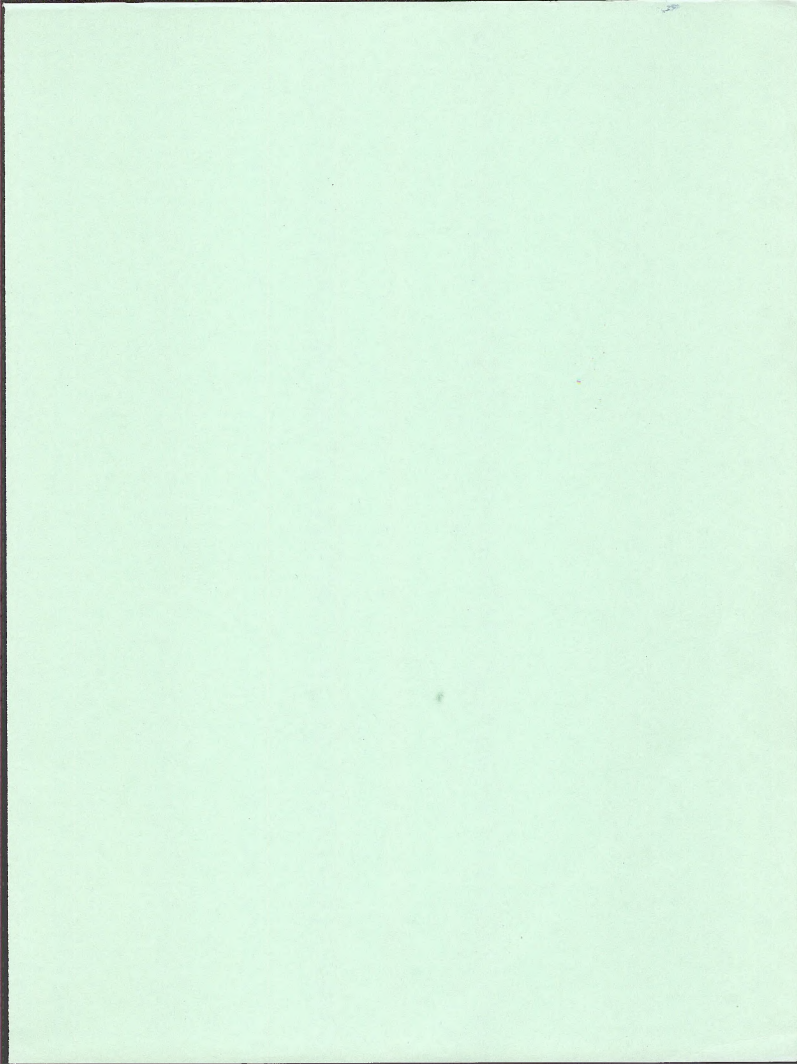
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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
TULSA DISTRICT
221 North Service Road
Moore, Oklahoma 73160-4946